

LOUISIANA conservationist

july—august, 1971



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**Better to hunt in fields, for
health unbought,
Than fee the doctor for a
nauseous draught.
The wise, for cure, on
exercise depend;
God never made his work for
man to mend.**

—John Dryden

September will usher in the start of Louisiana's long hunting season, one that except for a few short intervals will last from the start of the dove season and extend through the spring wild turkey season, spanning nearly six months. There are few states in the country that offer such diversified hunting opportunity, or such a long list of both resident and migratory animals and birds to hunt.

At the present time opponents of all sport hunting are combining forces and have started a national campaign to convince the general public and elected officials that total protection is necessary for the perpetuation of wildlife resources. With growing public interest in environmental matters and a general belief that man has been derelict in protecting the quality of his environment, it is understandable that the public is receptive to those who falsely forecast that hunting threatens the extinction of certain game species.

In truth, none of the game species hunted are on the endangered list; and on the contrary have increased in numbers under greater hunting pressure, as the direct result of wildlife management practices.

In short, the hunter is the great-

est friend of wildlife and it is because of his interest that state and national wildlife management programs were instituted, today providing more game for an ever-increasing number of persons seeking outdoor recreation in the form of hunting.

To be more specific, let us take a look at hunting in Louisiana last season as compared to prior seasons. This will produce some cold hard facts that the opponents of hunting can not deny.

During the 1970-71 deer hunting season, the number of deer hunters in Louisiana increased by 2,765, raising the total of deer hunters from 141,949 during the prior season to 144,714. This is an accurate figure based upon the number of big game hunting licenses issued. The total number of deer harvested by hunters increased from 52,926 to 53,271. Surely, this reflects wise management of Louisiana's deer herds and increased outdoor recreation in the form of hunting with no danger to this wildlife resource.

Another prime example of wildlife management can be seen in duck hunting during the 1970-71 season. Excellent water conditions in the waterfowl nesting grounds during 1970 resulted in a bumper crop of ducks. As a result, Louisiana duck hunters were granted the most liberal season and bag limit in two decades. This stimulated interest in duck hunting and resulted in the sale of an estimated 127,000 duck stamps in Louisiana, an increase of 21,000 over any previous year. At first glance, this might be interpreted as an increase in hunters and a larger bag of ducks. But there are deeper implications.



Clark M. Hoffpauer

It resulted in an increase of approximately \$63,000 in duck stamp funds for federal waterfowl restoration programs; stimulated the greatest contribution to Ducks Unlimited ever from Louisiana; and resulted in countless marsh management and habitat improvement programs at private levels throughout the state.

That the waterfowl resource was not impaired can be seen in this year's successful hatch of as great a number of ducks as last year, and possibly greater. Full evaluation of what happened during last season's waterfowling shows that hunters participated more actively in waterfowling and found recreational opportunity in the logically generous season. In turn, it resulted in significant contributions to the overall welfare of waterfowl populations.

And so it goes with other forms of huntable wildlife. Game population may fluctuate from year to year, depending upon weather, habitat and other factors; but one does not find game birds and animals on the endangered species list.

In these days of sometimes rash national movements to immediately restore the environment and to nurture some forms of diminishing wildlife, it should be remembered that it is not the hunters' guns that have placed certain species of wildlife in danger. On the other hand, it is the country's sportsmen and their dollars spent in habitat improvement and management that have allowed increasingly larger numbers of persons to discover and enjoy the wholesome sport of hunting.

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I give my pledge as an American to
save and faithfully to defend
from waste the natural
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and minerals, its forests, waters
and wildlife.



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Riches From The Sea

Wilson G. Gaidry III and Bob Dennie

Photography by Lloyd Poissenot

Riches aptly describe the bountiful products reaped from Louisiana's coastal and offshore waters. Shrimp, fish, oysters and crabs delight the gourmet and support a thriving industry in our coastal parishes.

Soft shelled crabs are considered an ultra delicacy and their production has a great potential for commercial operations.

From a biological viewpoint shrimp, crabs and crawfish found in Louisiana's waters are closely related. They all belong to the scientific class known as Crustacea, order Decapoda (Latin: meaning "ten feet"). These creatures are cold blooded animals, almost entirely aquatic, usually marine, with five pairs of legs, an elongated body, and a tough inelastic exoskeleton.

Crustaceans wear their supporting skeleton outside to protect and support their soft inner bodies. Animals such as fish and mammals have internal skeletons to support their

bodies. This type of skeleton allows the animal to grow proportionately in all directions without restrictions.

Though the growing process is continuous until reaching maturity, crustaceans with external skeletons must shed these shells in order to grow. The shedding process is called molting, and allows crustaceans to grow and also regenerate any lost limbs. However, it puts these animals in the predicament of a small elephant feeding inside a tight fitting box. The elephant and crustaceans must grow in order to mature, but the box or the crustaceans' shell are inert structures incapable of growth. Thus the containing box or shell either breaks or the animal ceases to grow.

The blue crab, being a crustacean, molts in order to grow and mature. When this happens, the blue crab becomes the soft shell crab and when properly prepared, will excite the taste buds of any seafood gourmet!

Boiled as a hard crab or fried as a soft shelled crab, the seafood eaters' love is the blue crab, which scientists call *Callinectes sapidus*.

Most crustaceans developed over 500 million years ago, but fossil

Opposite Page—Food for a gourmet—a fried soft shelled crab. Above—First step in the neat profit-turning business of "making" soft shelled crabs is catching blue crabs. Some commercial fishermen use lines, others use pots.

evidence indicates that the blue crab did not evolve until the Miocene Period, or about 20 million years ago. In nature, the blue crab is grayish or bluish green of varying shades and tints with red spines and joints. Its natural range extends from Nova



Scotia to Uruguay, and it has been introduced into the waters along many European coasts. Nowhere in its range is the blue crab so popular as along the Gulf coast.

Mature female crabs with large yellow egg masses attached occur in the Gulf from December to October, but they are more common during March and April, and again in June and July when the peak spawning cycles occur. At this time, females are referred to as "berry" or "sponge" crabs and are protected from harvesting by Louisiana law. The number of eggs produced and contained in an egg mass or sponge may range from 700 thousand to more than two million. During the summer months when the Gulf waters are warm, these eggs, once deposited, hatch in approximately 15 days. Once



Left—a commercial soft shelled crab dealer holds a soft shelled crab that is now ready for market, note basket of shed shells. Above—shows the soft shell and the hard shell from which it emerged in order to grow. The process, repeated many times during a crab's life, is called molting.

hatched, the crab larvae live a free floating existence, moved about by wind and tide, drifting with many other tiny organisms.

When they transform to the first crab stage, they begin a migration into the estuary toward nursery grounds. The crabs reach the mating areas, located in the northern extremities of the nursery grounds, late in the first year or early in the second year of life. Also, after the first crab stage is reached, the animals continue to molt as they grow and undergo about 18 to 20 additional molts before reaching maturity.

The males may mate more than once during the intervals between their last three molts, but the females mate only once during their last molt. Usually a female fertilized in late summer drops her first egg

mass the following spring at an age of approximately two years, but egg laying may be at any time from two to nine months after mating. A second spawning may occur later in summer among some individuals and possibly a third spawning may take place as late as the following spring. This limits the age attained by the blue crab to an approximate maximum of three years. It should be noted that in order to spawn successfully, the female crabs, soon after mating, must move offshore into more saline (saltier) waters. The males remain in the fresher waters of the estuaries. The offspring move again into the fresher waters of the estuaries to feed, mature and mate.



Packaged carefully in Spanish moss, this box of live soft shell crabs will be kept under refrigeration and quickly marketed. The demand is greater than the supply. Opposite Page Right—shows four crabs in various stages of shedding.

thus completing the life cycle.

The soft shell crab is very susceptible to predation and must seek some type of protection. Only females in their last molt are protected by the males, as a hard shell male would make a quick meal of any other crab in the soft shell state.



Close up of a soft shelled crab starting to emerge from its confining hard shell.



Thus, soft shelled males and immature females seek isolation in vegetation, the recesses of oyster reefs, tin cans and even old crab traps until their new shell becomes hard.

Watching a blue crab as it slowly emerges from its old shell with all its complex parts intact, perhaps even with a new, full size claw where only a remnant had been, is to witness the marvel of nature. The technical term for molting is ecdysis, technically a very complex process. An accurate scientific explanation of molting only adds to the full effect this majestic spectacle has on the observer, though he may have seen it many times before. Although outwardly the crab appears somewhat

dormant internally it is undergoing multitudinous physiological changes. Since the old shell will be useless once cast off, the crab must conserve all possible minerals and organic materials before molting. From three to four weeks prior to molt, the physiological alterations begin. This period is called premolt.

Crabs first withdraw calcium and other minerals from the exoskeleton to be shed. These substances, stored in the body, are used later in forming the new shell. As molting time approaches, the crab stops feeding and seeks protective cover until after the new shell has hardened. During the actual molt, the crab rapidly takes in water perhaps 70 percent of the premolt body weight. The swelling produced by this water intake splits the old shell and the crab begins to pull itself free. The molting crab continues to take up water even after emerging from the old exoskeleton. This water increases the crab's body size by as much as two times so that when the new shell forms and hardens, inside growth may occur.

A great potential for expansion exists in the soft shell crab industry; at present the demand far exceeds the supply. In 1969, Louisiana produced 196,600 pounds of soft shell crabs valued at \$161,236.

Hard shell crabs which are about to molt are called "peelers" or "bust-



Gentle pressure of a finger readily reveals the softness of a crab that has just shed its hard shell in order to grow. Below—Before and after. The old hard shell, just shed is shown at left and the soft shelled crab, so highly prized by persons who want the finest in seafood is shown at right. Opposite Page Right—In the shedding bin or tank, a male crab will hover over a shedding female in order to protect her during the shedding process.

ers", and are obtained from trawlers and crab fishermen. Crabs may also be taken by placing brush with the branches down in the water, thus attracting crabs by offering protection as a hiding place during the molting process. These crabs, both "busters" and soft shells, are collected by placing a net under the bush while raising it from the water. Little expense will be encountered in keeping the "busters" until they molt.

Initial obstacles to overcome in setting up production of soft shell crabs are: (1) obtaining a constant supply of "busters" or "peelers"; (2) making the holding pens for these crabs; (3) gaining experience in handling the busters in approximating an individual's time of molt by visual inspection; and (4) locating a ready market for the soft shells. This last objective will be the easiest of all because, generally, the demand for soft shelled crabs far exceeds the supply.

Crabs in the "buster" or "peeler" stage when held until molting occurs, which is usually three to four weeks, can bring tremendous profit.

Even with the use of elaborate pumps and filters to circulate and purify the water in the holding area

the margin of profit is excellent on a large scale operation.

Additional cost of operations are usually justified as these water systems will lower the mortality rate as much as 10 to 20 percent. Water quality is probably the most important factor in the successful molting of soft shells. It should be as clear as possible and from a clean source. Silty water will kill the "busters" as fast as an algae bloom would by depleting the water of its oxygen and suffocating them.

In South Louisiana, there are two methods used in the cultivation of soft shell crabs. The first method involves buoyant cages called floats. The floats vary in size, but are generally 8 to 10 feet long and 4 feet wide. All floats average approximately one foot in depth. The sides are made from closely placed wooden slats to allow water circulation. About 1500 crabs can be kept in a single float under normal conditions. The floats are tied against a dock along the bayous or lakes where brackish water with 8 to 15 parts per thousand salinity circulates and aids in keeping the crabs alive. The crabs in each float are grouped according to nearness of molting time, since those far from molting are still eating and would devour the soft shelled crabs.

The second method for the cultivation of soft shells is the water table. Here again, sizes vary, but



generally the watertight trough with 6 to 8 inch sides is varied between 9 and 12 feet in length by 5 feet in width. A series of troughs may be used, each one successively lower than the last. Water with a salinity of 8 to 15 parts per thousand is pumped to the highest trough in the series, and allowed to circulate downward through the other troughs. Soft shell crab producers, from years of trial and error experimentation, favor certain methods of circulation



and cultivation over others. One method involves pumping the water through a perforated hose so that it is emitted in tiny streams which allows the water to be more easily oxygenated; supposedly, this sustains the crabs better and lowers the mortality rate of "busters." Theoretically, a person could produce soft shelled crabs in his own back yard if he would find a convenient way to frequently transport salt or brackish water to the location.

By far, the most difficult skill to master for the profitable production of soft shelled crabs is the ability to identify a "buster" and the approximate time at which it will shed.

Most fishermen take only female crabs clutched beneath males. These females will be undergoing their last molt and fertilization.

There are, however, evident changes in the appearance of crabs which characterize them as "bust-

ers," and aid the fishermen in determining possible soft shells. At three weeks prior to molt, darkening tan streaks appear on the abdomen, the leg joints take on a rose color and, most important, a narrow white line appears on the edge of the second to last segment of the paddle. At two weeks or less from molt, a rose color edges the lines of the abdomen, the leg joints are pink, and the white line edging the second to last segment of the paddle is pink. At two days or less from molt, the joints are dark pink or red. The tips of the legs become gold colored, the pink or red line edging the second segment of the paddle becomes gold colored, and finally the shell begins to crack around the mouth at a few hours before shedding. Some crabs, usually females, appear to be "busters", but have actually passed their final molt. These can be identified by noting the dark brown color of the shell and, if female, the rounded rather than triangular shaped abdomen. Male "busters" are much more difficult to determine as they lack the abdominal streaks. They may be identified by the coloration of the paddle. It is wise to collect only female "busters" until experience is gained in positive identification of the males, or else keep the sexes separated. This is necessary since crabs which are ready to molt within two weeks or less cease to feed. Other crabs or "busters" three weeks from molt, however, are still feeding and will eat the molting crabs. This cannibalism can inhibit or even destroy soft shell production.

Not only must "busters" be determined with care, they should also be separated and grouped according to advancement towards molt-

ing. Particular care must be taken to isolate the crabs three weeks from molt, since they are still eating; and those crabs which are only a few hours from molt should be grouped separately.

Soft shells should be left in the holding pen for 1/2 to 3/4 hours after molting so that the new shell may harden slightly. This will prevent the crab from being crushed by its own weight when removed from its buoyant environment for storage or shipment. This fact favors the water table over the crab floats, for in the floats the molting crabs and soft shells are exposed to the tiny but voracious grass shrimp which prey upon them. Catfish will also feed on crabs placed in floats by eating any claws and legs which may happen to be exposed. Filters on pumps feeding water tabled can be used which will prevent intrusion by many of the predators. Care should be taken in selecting the pumping location, as silts or pollutants will devastate a water table faster than a catfish or shrimp attack on a float.

The evolution of the soft shell crabs through their various stages of life is certainly another example of the wonders of nature. There has always been an air of mystery to this phenomena and what exactly it entails. Research by members of the commission has been shedding light on this picture in order that we may better understand it. But by no means is there any question in anyone's mind as to delights found in savoring these delectable crustaceans at the table.

electronic alligators



Personnel of the Refuge Division of the Louisiana Wildlife and Fisheries Commission are currently utilizing some of the newest and most sophisticated field equipment to be introduced into the field of wildlife management in recent years—radio telemetry. That is, tracking animals which have been radio equipped with a collar-type radio package. Telemetry was first used in the late 1950's and is presently being employed on the Rockefeller Refuge to delve into facets of the life history of the American alligator. For the past three years, biologists of the Refuge Division have been capturing and attaching radio collars to sexually mature male and female alligators and tracking these alligators with portable receivers. The objectives of these studies were to determine the daily and seasonal movement of individual alligators. Also,

to determine the minimum home range of individual alligators and to relate the movements to habitat preferences.

Due largely to excessive hunting pressure, Louisiana's alligator population declined drastically from the mid-1930's through the early 1960's. This population decline was primarily brought about as a result of a systematic exploration of the natural resources of the coastal marshes of the state. Canals were dug into the remote areas of the marshes for the development of the various oil and gas leases. In a relatively short period of time, the development was expanded to include a network of canals along the entire Louisiana coast. This network of waterways provided hunters and trappers convenient access to the more remote marshes for the purpose of hunting alligators and trapping fur-bearing animals. This activity also

brought about a drastic change in the plant ecology of the entire Louisiana coast.

A species as vulnerable as the alligator could not withstand this indiscriminate killing and within a short period of time the alligator population was greatly reduced. Louisiana became aware of this population decline in the mid-1950's; however, only general management practices were known concerning this reptile. Protection was the main tool used in managing the alligator and in 1960 the first law was passed aimed at its protection. A size limit and maximum season length was established in order to curtail some of this hunting pressure in 1963, the season was closed statewide and enforcement activities were stepped up in order to afford the necessary protection to enable this animal to stage a comeback.

However, today this population decline is being reversed. With the strict enforcement effort exerted on alligator poachers, illegal buyers, and dealers, and the stiff fines and in some cases jail sentences handed down to the poachers, the alligator population has virtually tripled statewide over the past decade.

TED JOANEN AND LARRY McNEASE

Photography by Lloyd Poissenot

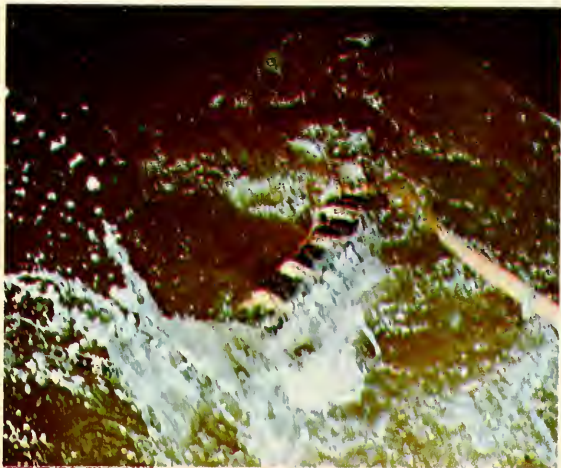
Studies conducted on Rockefeller Refuge for the past few years have demonstrated that more information is needed on the alligator movements and factors effecting movement before habitat management can be initiated. Also, in setting harvest regulations, alligators can be selectively harvested when the movements of certain segments of the population are known. With this in mind, a telemetric study of adult alligators was begun on Rockefeller Refuge in the summer of 1969.

It became quite apparent in the past decade that radio telemetry can contribute sufficiently to the field of wildlife management. Radio telemetry has become a tool that permits the observation of an animal continuously, completely undisturbed, and in its natural environment. The use of radio telemetry allows a more comprehensive study of the alligator in its environmental niche than is possible using conventional methods of marking and recapturing.

In 1969, five adult females were equipped with collar-type transmitters and monitored daily for a period from mid-May to early November (onset of hibernation) with a portable directional receiver. Tracking alligator movements normally involved the use of a hand-held antenna from permanent listening stations. At the time a radio signal was received the direction of the signal was determined by compass bearings and the station number and compass bearing recorded. These compass bearings were then plotted on a map and the exact



Alligators are hunted at night with headlamps. Here a snare trap is being slipped over an alligator's head. Violent thrashing takes place when the snare is triggered. Then it is up to the researchers to get the alligator into the boat and secured in a sack.





position of the animal was determined. At least two compass bearings had to be made to accurately locate each animal.

During the study involving the nesting females, it was found that these alligators used two distinct marsh types. The females were found to use open water areas (canals, bayous, or large ponds) almost exclusively during early spring (courtship and breeding period). For the remainder of the year for which the alligators remained active, the females spent the majority of their time in isolated dens in the marsh. The movement from open water to marsh dens took place in early June, just at the onset of parental duties involved with nest construction and egg laying.

The greatest amount of movement for females was found to occur in May, as one would expect, when they had their intentions focused on courting. Once nesting began, the maternal instincts of these animals took over and their activities were largely centered around a one-third acre area surrounding the nest site. Home range for the females averaged in size from 6.4 acres up to 40 acres in size.

Daily information currently being collected on the males is adding appreciably to our overall understanding of this animal. If we had to pick one phrase to best describe the big bull alligator it would be unquestionably, "playboy after dark." His large size and aggressiveness lets him reign supreme over the marsh and this is reflected in his movement patterns.

Initial data on the male indicates that they have very large territories, occasionally traveling from four to five miles in one night's time. One nine foot bull moved some 20 miles from his capture location over a two and one-half month period. The majority of the males tend to prefer open water areas, such as, canals, bayous, and large marsh ponds and these are the animals that show the greatest amount of movement.

A couple of the gentlemen currently under study have moved into large land-locked marsh ponds and old abandoned bayous. These alligators have exhibited quite a bit of daily movement, but their movements seem to follow a set pattern. Home ranges for these bulls are not nearly as large as for the alligators using the canals and open bayous.

The ultimate goal of the professional wildlife manager is the wise use on a sustained yield basis of our natural resources. With a better understanding of the movement patterns and preferred habitat types of the adult alligator, management practices could then be incorporated into a management plan to encourage and maintain maximum population levels of alligators. Once this population level has been reached then and only then could a sustained yield harvest be recommended. If we apply this concept of management to the alligator, the utmost care should be exercised in protecting the breeding segment of the population. The big bulls and mature females make up only a small portion of the overall population. This segment of the population must be protected to insure a good

crop of alligators each year.

The tendency of the adult alligators to selectively seek out open water areas during the spring and early summer demonstrates that this is an important consideration to be made in the management of the alligator. Installation of water control structures have proven desirable in stabilizing water levels during periods of drought or low tides. This type management would maintain the open water situation needed by the adult alligators during this period and also enhance the value of the

water area for aquatic forms of life which are so important in the alligator food chain.

In the past, the alligator has proven to be a valuable resource to Louisiana residents. Only through proper management, enforcement, and research can this animal be maintained at a harvestable level. It is the intention of the Louisiana Wild Life and Fisheries Commission to see that every effort is made with the alligator so that this animal may continue to be a perpetual and useful segment of Louisiana's economy and ecology.

Opposite Page—Radio telemetry is one of the latest tools in alligator research. Here an alligator is being fitted with a radio transmitter which will allow researchers to follow its movements without visual contact. Fastening the collar firmly in place is last step in preparing an alligator for radio telemetry research.

Upper Right—Close up of the transmitting device that will allow researchers to trace the movements of this alligator.

All alligators are weighed, measured and given permanent markings so that growth rate can be determined when that alligator is again taken by persons engaged in alligator research.

Eventually the transmitter will be worn off leaving the alligator with only a plastic collar. Meanwhile much valuable data will have been collected by radio telemetry.



ADVENTURE

BELOW
THE
SURFACE



K. Morrislock

ROUGHLY TWO DECADES AGO, as offshore petroleum operations began to develop rapidly in the sometimes bright and sunny, and sometimes rough and sultry Gulf of Mexico; a new breed of fishermen appeared on the Louisiana scene. They were underwater spearfishermen, perhaps rightfully called counterparts of the celebrated frog men of World War II whose daring missions are preserved today in movies, fact and fiction.

But World War II was becoming a memory and the offshore petroleum exploration and production platforms were destined to change the entire picture of offshore fishing.

As the costly drilling and production platforms marched like an army of giant steel spiders off Grand Isle, fanning both east and west but moving ever into deeper water searching for and finding oil and gas, ecological changes began taking place in the gulf. They were not harmful changes, as fisheries statistics for Louisiana and other northern gulf states readily reveal.

The welded steel stanchions that criss-crossed the huge structures underwater began to collect algae, which stripped of its scientific names is basically primitive chlorophyll-bearing plants that start a food chain cycle. This attracts little bait fish. They in turn attract bigger fish, and these attract even bigger fish. In short, the platforms that fishermen call "rigs" became artificial reefs offering housing to varieties of fish that may have been present in the gulf for hundreds of years, but had never felt the sting of a baited hook, or the steel shaft of a spearfisherman.

How the offshore platforms developed into havens for schools of fish is a simple matter of ecological progression. The underwater steel columns of the platforms continued to gather coatings of aquatic moss, barnacles and other marine growth. Soon an



Underwater spearfisherman is shown straddling stanchion of offshore petroleum platform ready to spear a fish. Note the aquatic moss and barnacle growth. This is the start of the ecological change that turns an offshore platform into an artificial reef harboring many species of fish.



The Poisonous Snakes of Louisiana and the Emergency Treatment of Their Bites

Edmund D. Keiser

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Introduction

Snake! Even the word has emotional impact. From the Garden of Eden to the dawn of the Age of Space, few animals have so stimulated the adrenalin and imagination of man. As a topic of conversation and as the basis for legends and superstitions, snakes are seldom equaled. Rare is the human who does not have momentary chills and acceleration of heart beat when, by accident or intent, he encounters a serpent within its natural environment. We humans tend to be fascinated by things we fear, and many of us do fear snakes. Perhaps our fears are based on misconceptions or on childhood experiences magnified beyond reality by the passing years. Perhaps these fears have root in our knowledge that some snakes are venomous and, as such, are possible hazards to our existence. Whatever the basis, most snakes are inoffensive. Of Louisiana's 39 species, 33 are not the least harmful to human health or life. Those persons who are well informed and who can identify the poisonous species need have no concern when a beneficial garter snake or a harmless earth snake is encountered. Only six species of Louisiana snakes are dangerous to man, and one of these is limited in distribution and very rare. As public enthusiasm for outdoor recreation continues to grow, more and more people are venturing into wild areas where chance encounters with poisonous snakes are likely. Several dangerous species may even be found within the city limits of our larger communities. Poisonous snakes thus constitute potential hazards for housewives, gardeners, outdoor workers, and children at play. No one desires to be bitten by a poisonous snake. For peace of mind and self protection, every Louisiana citizen should learn to recognize our six harmful species and to supply emergency first aid in case of poisoning.

SNAKEBITE STATISTICS. Fear of death from snakebite induces considerable emotional uneasiness in many persons. A few individuals are so disturbed by this fear that they are unable to relax and enjoy outdoor activities. The bite of a poisonous snake is a serious matter, but the fatality rate from poisoning is much lower than hearsay would suggest. Although the mortality rate for untreated snakebite cases may reach or exceed 15% (Russell, 1962), Parrish (1966) considered the fatality rate in **medically treated** snakebite cases in the United States to be less than 1%. He gave an estimate of 6,680 snakebite cases in the United States during 1959, or about 3.74 cases per 100,000 persons

(1960 census). He reported 334 cases of venomous snakebite in Louisiana during the same year—an incidence of 10.25 bites per 100,000 Louisiana citizens. Minton (1957) noted that deaths from snakebite were probably less than 50 per year in the entire United States.

THE MECHANISM OF POISONING. A wealth of legendary nonsense contributes to the public suspicion that snakes are capable of exposing humans to their poison in a variety of ways. In actuality, Louisiana snakes inject venom **ONLY** by biting. **NO** Louisiana snake squirts venom or exhales poisonous breath at a victim. **NO** snake possesses a tail stinger. **NO** snake has a poisonous tongue. The forked tongue of a snake is a harmless, odor-sensing device that is not in any way connected to the venom apparatus.

The venom of our deadly species is secreted from glands located on each side of the head just behind and slightly below the level of the eye (Fig. 2B). The fangs are enlarged hollow teeth (Fig. 2D) located at the front edge of the upper jawbone. Venom is discharged through openings on the front of the fang near the tip. Fangs are functional for 2 or 3 weeks and are then replaced. Several reserve fangs are normally present. When replacement time approaches, the reserve fang closest to the front moves into position adjacent to one side of the functional fang. The old fang is retained until the replacement fang is firmly anchored to the jawbone. Thus one may occasionally see snakes bearing two fangs on one or both sides of the upper jawbone. Because of this continuous replacement, snakes are not rendered permanently harmless by the removal of the functional fangs.

The amount of venom injected varies with the size and species of the snake. Although the glands of poisonous species normally contain sufficient venom for the delivery of a potentially fatal dosage, a snake will rarely empty the glands in a single bite. Snakes may even inject little or no venom. Variable factors influencing the outcome of snakebite include the age, size, condition, and species of the snake involved; the depth of fang penetration; the anatomical location of the bite; the age, size, sex, general health, and physiological condition of the victim; and the nature and timing of the medical treatment given after the bite.

Identification of the Poisonous Snakes of Louisiana

Six species of venomous snakes are found in Louisiana: the cottonmouth, the copperhead, the pigmy rattlesnake, the canebrake rattlesnake, the eastern diamondback rattlesnake—these five are “pit vipers”—and the eastern coral snake. With little effort anyone can learn to identify most individuals of these species at a glance.

A person unfamiliar with snakes should not, however, expect to recognize Louisiana's poisonous species at a distance until he has become familiar with their identifying characteristics. The beginner will probably find it necessary to have the snake close at hand in order to ascertain its species. A live or dead snake in a transparent container may be easily and accurately identified by the use of the “key” contained in this section. If the snake can only be observed at a distance of several yards or more, its identification can best be achieved by comparing the snake with the photographs and with the descriptions under “Species Accounts.”

All Louisiana venomous snakes, with the exception of the coral snake, possess heat-sensitive loreal pits (Fig. 1B), vertically elliptical pupils (Fig. 1B), and a single row of scales on most of the underside of the tail (Fig. 2G). None of our harmless species exhibits these features. **The coral snake has red, yellow, and black rings around the body and is the only Louisiana snake with red body rings contacting yellow body rings.** Remember the jingle: “Red and yellow kill a fellow.”

The following key is an arrangement of characters useful for identifying the poisonous snakes of Louisiana. To use this key, the reader should study both choices under item 1 and determine which of the two contrasting characters is more descriptive of the animal to be identified. For example, the choice to be made in item 1 is whether or not the animal in question possesses legs. If it does, the answer indicated is that the animal is “not a snake.” If no legs are present, the reader is referred to item 2. He should then read both choices under item 2 and decide which better fits the specimen, proceeding accordingly. One thus moves through a key by a series of choices that will eventually lead to the correct name of the snake—if it is a venomous species. **Identifications should be verified by reference to the “Species Accounts” and the illustrations.** Unusually colored (all white, all black, or oddly-patterned) pit vipers can usually be identified as pit vipers, but identification to species may prove difficult for the amateur. Oddly-patterned coral snakes, while relatively

rare, may require identification by an expert. Characters utilized in the key and in the “Species Accounts” which follow are illustrated immediately after the key. The figures are intended only as illustrations of the described characters; the conditions illustrated may not be mirrored in exact detail by the species under discussion. A photograph of each species is included on the page facing the beginning of the account of that species. All photographs are by the author unless otherwise indicated.

The data on record sizes are from Conant's *A Field Guide to Reptiles and Amphibians* (1958).

Key to the Poisonous Snakes of Louisiana

- 1. Legs present. Not a snake
- Legs absent go to 2
- 2. Movable eyelids present Not a snake
- Eyes covered with a transparent membrane, lacking movable lids (Fig. 1A, 1B) go to 3
- 3. Loreal pit absent (Fig. 1A); scales on underside of tail in a double row (Fig. 2F) go to 4
- Loreal pit present (Fig. 1B); scales on underside of tail in a single row, at least toward the base of the tail go to 5
- 4. Color pattern of black, red, and yellow rings completely encircling body, with red and yellow rings in contact; snout black and in contact with a wide yellow head-band EASTERN CORAL SNAKE
- Color pattern usually not of black, red, and yellow rings completely encircling body, but, if so, the red rings do NOT contact the yellow rings; snout not black, or if black, followed by a narrow yellow head or neck-band Harmless snake
- 5. Tail not ending in a rattle or horny button (Fig. 2F, 2G) go to 6
- Tail ending in a rattle or horny button (Fig. 1C, 1D) go to 7
- 6. One or two scales of the upper lip in contact with eye (Fig. 3D) COTTONMOUTH
- Scales of upper lip separated from eye by small scales (Fig. 3C) COPPERHEAD
- 7. Nine large scales on top of head (Fig. 3B) PIGMY RATTLESNAKE
- Scales on top of head small, irregularly arranged, and many more than 9 in number (Fig. 3A) go to 8
- 8. Dorsal (back) pattern of large, dark brown or black, diamond-shaped markings with light centers; dark, oblique eye stripe outlined by white ending in front of the angle of the jaws EASTERN DIAMONDBACK RATTLESNAKE
- Dorsal pattern of dark, irregular blotches which may be V-shaped, but are rarely diamond-shaped; dark, oblique eye stripe not outlined by white, ending well behind the angle of the jaws. CANEBRAKE RATTLESNAKE

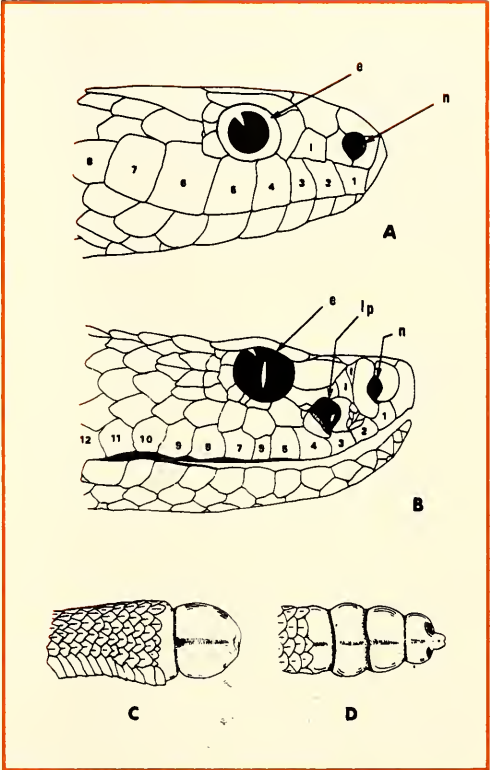


Figure 1.
A. Side of the head of a harmless snake: e, eye; l, loreal scale; n, nostril. The lip scales are numbered.
B. Side of the head of a poisonous pit viper: e, eye; l, loreal scale; lp, loreal pit; n, nostril. The lip scales are numbered.
C. "Button" of a newly-born canebrake rattlesnake.
D. Rattle of a pigmy rattlesnake.

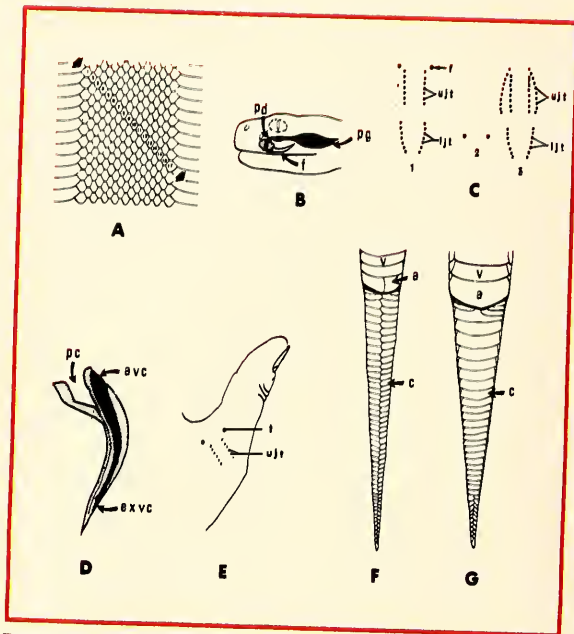


Figure 2.

- A. Method of counting dorsal scale rows of a snake. Arrows indicate direction of counting. Counts are made at mid-body level.
- B. Poison gland and fang of a poisonous snake: **f**, fang; **pd**, poison duct; **pg**, poison gland. The stippled bone is the left maxilla.
- C. Tooth marks of a poisonous and of a harmless snake: (1) complete tooth pattern showing tooth marks of upper and lower jaws of a **poisonous snake**: **f**, fang; **ujt**, upper jaw teeth; **ljt**, lower jaw teeth. (2) incomplete tooth pattern showing only fang marks. **f**, left by the bite of a **poisonous snake**. (3) complete bite pattern of a **harmless snake**: **ujt**, upper jaw teeth; **ljt**, lower jaw teeth.
- D. Sectioned fang of a poisonous snake: **evc**, entrance to venom canal; **exvc**, exit or discharge opening from which venom leaves the fang; **pc**, pulp cavity.
- E. Complete bite pattern of the upper jaws of a **poisonous snake**: **f**, fang; **ujt**, upper jaw teeth.
- F. Underside of tail of a snake illustrating double row of scales, **c**; ventral scales; **v₁** and divided anal plate, **a**.
- G. Underside of tail of a snake illustrating single row of scales, **c**; ventral scales, **v₁** and undivided anal plate, **a**.

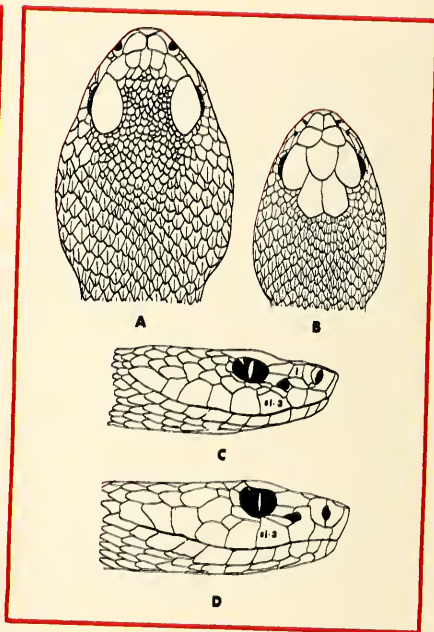


Figure 3.

- A. Top of the head of a canebrake rattlesnake illustrating the small, irregularly arranged head plates.
- B. Top of the head of a pigmy rattlesnake illustrating the nine large, regularly arranged head plates.
- C. Side of the head of a copperhead: **l**, loreal scales; **s1-3**, third lip scale not in contact with the eye.
- D. Side of the head of a cottonmouth illustrating the absence of loreal scales and the contact of the third lip scale, **s1-3**, with the eye.

Species Accounts

COTTONMOUTH

(*Agkistrodon piscivorus*)

OTHER COMMON NAMES. western cottonmouth, black moccasin, blunt-tail, congo, water moccasin, lowland moccasin, stump-tail.

LOUISIANA DISTRIBUTION. The cottonmouth is the most abundant poisonous snake in Louisiana. It is found throughout the state and is most common in the vicinity of swamps, shallow lakes, salt marshes, drainage ditches, bayous, and shallow streams. At certain times of the year, individuals may be encountered on higher ground a considerable distance from water. Congregations consisting of hundreds of individuals may occasionally be found at denning sites in late fall and early spring or along the borders of flooded areas immediately after hurricanes.

IDENTIFICATION. Cottonmouths may be distinguished from all other Louisiana snakes by these features: loreal pits present (Fig. 1B); vertically elliptical pupils (Fig. 1B); a single row of scales on most of the underside of the tail (Fig. 2G); tail lacking a horny button or rattle; **no loreal scales** (compare Fig. 3C & 3D); **scales of upper lip in contact with eye** (Fig. 3D); **and usually 25 dorsal scale rows at midbody** (Fig. 2A). The coloration is variable, but the basic pattern usually consists of 10 to 15 wide dark crossbands on an olive, brown, or black ground color. Juveniles are usually boldly patterned and are lighter in color than adults. Very old adults may be almost entirely dark brown or black with only traces of pattern remaining. Juvenile cottonmouths, as well as juvenile copperheads, possess yellowish tail tips. The bellies of cottonmouths are heavily blotched with dark brown or black over a yellowish or brownish ground color. **The underside of the tail and the rear of the belly are black in most specimens.**

SIMILAR SPECIES. The cottonmouth is frequently confused with the closely related copperhead. The copperhead, however, usually has 23 dorsal scale rows; it has loreal scales; and the scales of its upper lip do not contact the eye. Water snakes of the genus *Natrix* are often erroneously termed cottonmouths and occasionally misidentified as such. Water snakes have round pupils and a double row of scales under the tail. They also lack loreal pits.

COMMENTS: Very little is known about the courtship and mating habits of cottonmouths in Louisiana. These

snakes normally give birth to six or seven young in July, August, and September. Litters ranging from one to 16 young have been recorded. Young average about 9 inches in total length. Cottonmouths feed on almost any available flesh, including carrion. Various invertebrates, fish, frogs, other snakes, young turtles and small mammals make up the bulk of the diet. The lining of the mouth is a pinkish white, and the name "cottonmouth" was probably derived from the animal's habit of opening its mouth widely when disturbed, thus exposing the delicate membranes within. The record length of the cottonmouth is 54 inches. The subspecies found in Louisiana is *Agkistrodon piscivorus leucostoma* (Troost), the western cottonmouth.

COPPERHEAD

(*Agkistrodon contortrix*)

OTHER COMMON NAMES. southern copperhead, chunkhead, copperhead moccasin, highland moccasin, hill moccasin.

LOUISIANA DISTRIBUTION. Although the copperhead is found throughout Louisiana, it tends to be secretive in its habits and is less frequently observed than the related cottonmouth. Copperheads may be found in almost any situation with an abundance of cover, including upland pine forests; pine and mixed hardwood forests; deciduous woodlands; areas of heavy brush bordering swamps; salt marshes and bayous; rock or log-strewn hillsides; fence rows overgrown with small trees and shrubs; and wood and trash piles around farms and residential areas.

IDENTIFICATION. Copperheads possess the following characteristics: loreal pits present (Fig. 1B); vertically elliptical pupils (Fig. 1B); a single row of scales **at least toward the base of the tail** (Fig. 2G); tail lacking a horny button or rattle; **loreal scales present** (Fig. 3C); **scales of upper lip not in contact with eye** (Fig. 3C); **and usually 23 dorsal scale rows at mid-body**. The coloration is variable but normally consists of different shades of brown overlain by a bold pattern of large hourglass-shaped, reddish-brown or chestnut crossbands which are narrow in the mid-back region and wide lower down on the sides. On many individuals, the crossbands are broken at their narrowest point. **Viewed from the side, these crossbands are roughly triangular in shape, with the apex of each triangle directed toward the mid-back region.** The top of the head varies from yellowish-gray

to reddish brown. The belly has numerous large and irregular dark blotches. The juvenile pattern is similar to that of the adults except that the tail tip is yellow or greenish-yellow as in juvenile cottonmouths. **SIMILAR SPECIES.** Juvenile copperheads and juvenile cottonmouths are often confused as both are boldly patterned and both have yellow or greenish-yellow tail tips. The cottonmouth has usually 25 dorsal scale rows; it lacks loreal scales; one or more scales of its upper lip contact the eye; and most of the underside of its tail is black. Adult cottonmouths are usually dark with the pattern obscure or absent, while adult copperheads, except for rare all-black specimens, are light colored and prominently patterned.

COMMENTS. Courtship and mating of copperheads occur in April and May in regions where these activities have been observed. The gestation period is typically 105 to 110 days, and from one to 17 young (average is five or six) are born in August, September, or early October. Larger and older females apparently produce the largest litters. Young average 8 to 10 inches in total length at birth. The diet of copperheads consists mainly of insects, frogs, reptiles, and small mammals, especially rodents. Small birds may serve as prey on rare occasions. The name "copperhead" may be derived from the coppery-red coloration of the heads of individuals from some areas of the United States. The record length of the copperhead is 52 inches. The subspecies found throughout Louisiana is *Agkistrodon contortrix contortrix* (Linnaeus), the southern copperhead.

PIGMY RATTLESNAKE

(*Sistrurus miliarius*)

OTHER COMMON NAMES. western pigmy rattlesnake, ground rattlesnake, Strecker's rattlesnake. **LOUISIANA DISTRIBUTION.** The pigmy rattlesnake ranges throughout Louisiana. It is uncommon in some areas and fairly abundant in others. These snakes are found in a variety of habitats, including pine forests, deciduous woodlands, swamps, shrub-covered elevated areas in and around marshes, cane field, rock or log-strewn hillsides, and overgrown fence rows. They may be found even around homes, city parks, and drainage canals within many communities.

IDENTIFICATION. This is a small rattlesnake rarely exceeding 2 feet in total length. It may be identified by the following characteristics: loreal pits present

(Fig. 1B); vertically elliptical pupils (Fig. 1B); tail with a **very small horny button or rattle** (Fig. 1D); a single row of scales on most of the underside of the tail (Fig. 2G); loreal scales present (Fig. 1B); scales of upper lip not in contact with eye (Fig. 3C); **21 dorsal scale rows at midbody; and top of head bearing nine large symmetrical plates.** The pattern on the back is of dark irregular blotches (rarely diamond-shaped or V-shaped) on a lighter gray or grayish-brown background. One or two rows of dark spots are present on the sides of the body for most or all of its length. **A dark reddish-brown stripe down the middle of the back is normally present,** but it may be absent on some specimens. **Two wide, dark, elongated stripes are on top of the head and adjacent neck. A dark eye stripe angles backward from the eye and ends well behind the angle formed by the jaws.** This stripe may be bordered below by white.

SIMILAR SPECIES. No other Louisiana rattlesnake has nine enlarged head plates (Fig. 3B) or two wide dark stripes on top of the head and neck. Paired neck stripes may be present in the other rattlesnakes, but these rarely extend onto the top of the head.

COMMENTS. Details concerning the courtship and mating habits of pigmy rattlesnakes in Louisiana are unknown. Mating probably occurs in the spring. The young are born in July, August, September, and October. Litters commonly consist of four to eight young, but may range from one to 18. Young pigmy rattlesnakes are 6 or 7 inches in total length at birth and resemble the parents in color. Insects, spiders, frogs, toads, lizards, snakes, small rodents, and young birds comprise the diet. The common name is derived from the small size of these snakes. The record length of the pigmy rattlesnake is 25 1/8 inches. The subspecies inhabiting Louisiana is *Sistrurus miliarius streckeri* Gloyd, the western pigmy rattlesnake.

CANEBRAKE RATTLESNAKE

(*Crotalus horridus*)

OTHER COMMON NAMES. timber rattlesnake, cane rattler, banded rattlesnake, velvet-tail, highland rattlesnake.

LOUISIANA DISTRIBUTION. Canebrake rattlesnakes are found throughout Louisiana, but they are uncommon enough to be rarely encountered in most areas. During late fall and early spring, denning aggregations may be found in a few localities. Extensive flooding may

localize numbers of individuals on high ground at other times of the year. These large rattlesnakes are most common in heavily forested areas and are rarely found within our population centers. Upland pine woods, lowland forest, swamps, marshes, cane thickets, and abandoned farm lands may be inhabited by these snakes. **IDENTIFICATION.** This is a large rattlesnake which averages between 3-1/2 and 5 feet in length, with a record size slightly in excess of 6 feet. These snakes possess the following features: loreal pits present (Fig. 1B); vertically elliptical pupils (Fig. 1B); a single row of scales on most of the underside of the tail (Fig. 2G); tail with a horny button or rattle (Fig. 1C, 1D); one to three loreal scales (Fig. 1B); **eye separated from lip scales by two to four scales (Fig. 3C); 25 dorsal scale rows at mid-body (Fig. 2A); top of head covered by small scales and lacking large plates except over the eyes (Fig. 3A); and dorsal color pattern of blackish crossbands or V-shaped chevrons on a yellowish or gray-brown background.** These crossbands may be broken up near the neck to form rows of spots—usually one row on each side of the body and one or two rows down the back. **A reddish middorsal stripe is usually present. A dark eye stripe angles from the eye back beyond the angle of the jaws. The tail is either solid black or dark gray with dark rings.**

SIMILAR SPECIES. The pigmy rattlesnake rarely exceeds 22 inches in total length; it possesses nine large symmetrical plates on top of the head. The eastern diamondback rattlesnake, rare in Louisiana, is a large rattlesnake but lacks the reddish middorsal stripe; its dark eye stripe terminates in front of the angle of the jaws.

COMMENTS. Courtship and mating of canebrake rattlesnakes in Louisiana have not been studied, but mating apparently occurs in the fall and spring in other areas. Five to 17 young, ranging from 11 to 16 inches in total length, are born in August, September, and early October. The young are similar to adults in color pattern. Small mammals and birds probably make up the bulk of the diet, but insects, lizards, small snakes, and even fish have been reported as food items taken by these rattlesnakes. The common name is derived from the animal's habit of frequenting cane thickets in some areas of the southern states. The record length of the canebrake rattlesnake is 74 1/2 inches. The subspecies found through Louisiana is *Crotalus Horridus atricaudatus*, the canebrake rattlesnake.

EASTERN DIAMONDBACK RATTLESNAKE

(*Crotalus adamanteus*)

OTHER COMMON NAMES. Louisiana diamond rattlesnake, Florida diamondback, pinewoods rattler, pine diamondback.

LOUISIANA DISTRIBUTION. The eastern diamondback rattlesnake is a rare species in Louisiana, known after the year 1900 only from a few specimens from Washington and St. Tammany parishes. Prior to the 1900s, this rattlesnake may have had a more extensive range within Louisiana, probably extending through the Florida parishes to the Mississippi River. These snakes are most frequently found in dry pine woods, palmetto thickets, wooded areas within and around swamps, and abandoned, overgrown orchards and farmyards in other parts of their Gulf Coast range.

IDENTIFICATION. A very large rattlesnake frequently reaching lengths in excess of 6 feet and occasionally exceeding 7 feet. The identifying features are: loreal pits present (Fig. 1B); vertically elliptical pupils (Fig. 1B); a single row of scales on most of the underside of the tail (Fig. 2G); tail with a relatively large horny button or rattle; one to three loreal scales (Fig. 1B); scales of upper lip not in contact with eye (Fig. 1B); and 29 dorsal scale rows at mid-body (Fig. 2A). The color pattern of the back is distinctive, being composed of a **series of large diamond-shaped light-centered blotches usually boldly outlined by a single row of adjacent yellowish or whitish scales.** Dark rings partly encircle the tail. The ground color of the back is usually olive or brownish olive. The belly is most frequently a light yellow or cream toward the head and dark brown or olive toward the tail with poorly defined irregular dark blotches or spots. **A dark oblique stripe, boldly outlined above and below by white, angles backward from the eye and terminates just in front of the angle of the jaws.**

SIMILAR SPECIES. The pigmy rattlesnake rarely exceeds 22 inches in length; it possesses nine large symmetrical plates on top of the head. The canebrake rattlesnake reaches a large size but has reddish, chevron or V-shaped dorsal blotches; its dark eye stripe extends considerably beyond the angle of the jaws.

COMMENTS. Nothing is known about the reproductive habits of eastern diamondback rattlesnakes in Louisiana. In other areas, mating occurs in the spring, and from six to 21 young per litter are born in July, August,

or September. The young range in size from 11 to 14 inches at birth. Rodents, other small mammals, birds, and bird eggs make up the bulk of the diet of this species. These snakes are extremely dangerous, and due caution should be used by anyone venturing into wild areas of the state where these animals may still occur. The common name of this rattlesnake is derived from the diamond-shaped blotches prominent on the animal's back. The record length of the eastern diamondback rattlesnake is 96 inches. No subspecies have been described for *Crotalus adamanteus* Beauvois.

EASTERN CORAL SNAKE

(*Micrurus fulvius*)

OTHER COMMON NAMES. Louisiana coral snake, Texas coral snake, harlequin snake.

LOUISIANA DISTRIBUTION. Although an uncommon to rare snake in most areas, the eastern coral snake is found throughout Louisiana. This secretive species may be found in and under decaying logs and stumps, buried in leaves and humus, and under rocks. In Louisiana, these snakes inhabit the relatively dry pine forests, the pine and mixed hardwood forests, and the more humid floodplain hardwood forests surrounding bayous and swamps. In some Louisiana communities, coral snakes may be found in flower gardens, beneath stones of walkways, and underneath the foundations of houses. One specimen known to me was collected inside an outdoor air-conditioning unit! The animal did not appear at all disturbed by the vibrations produced by the noisy machine.

IDENTIFICATION. Coral snakes resemble no other Louisiana poisonous snakes. They are brightly colored and strikingly beautiful. **The snout is black and is immediately followed by a broad yellow head band and then a wide black ring on the neck. The body is encircled by yellow, red, and black rings, with the red bordered on each side by yellow.** The red rings of snakes occurring west of the Mississippi River tend to be heavily invaded by black flecks and spots, while coral snakes in the Florida Parishes usually show much less encroachment of black into the red. The tail is encircled by black and yellow rings and its tip is black. **The head of a coral snake is scarcely wider than the neck,** whereas the head of a pit viper angles out sharply from the neck. The snout of a coral snake is short and rounded. Other characteristics of coral

snakes include: **Loreal pits absent** (Compare Fig. 1A & 1B); **eyes black, with rounded pupils; a double row of scales on the underside of the short tail** (Fig. 2F); no horny button or rattle on the tail; No loreal scales; scales of upper lip in contact with eye and **15 dorsal scale rows at mid-body** (Fig. 2A).

SIMILAR SPECIES. The coral snake resembles the scarlet kingsnake (*Lampropeltis triangulum elapsoides*), Louisiana milk snake (*Lampropeltis triangulum amaura*) (Page 13), and eastern scarlet snake.

(*Cemophora coccinea copei*) (Page 13), harmless snakes found within our borders. Conant (1958), commenting on the similarities of coral snakes to other snakes wrote: "The venomous Coral Snakes are well imitated serpents. Several of our harmless snakes also sport rings (or near rings) of red, black, and yellow (or white). In all of them, however, black separates red from yellow. Think of a traffic light: red means **stop**, yellow means **caution**. If these two warning colors touch on the snake's body, it is poisonous."

COMMENTS. This is the only venomous snake in Louisiana which lays eggs. From one to 12 eggs are laid in late spring. The eggs hatch in late summer or early fall, and the newly-hatched young are 7 to 9 inches in length. The prey of coral snakes consists primarily of frogs, other snakes, and lizards. When this snake is disturbed, it will often bury its head beneath its coils and thrust upward with its tail as if to strike. The tail is black and blunt-tipped, and during the upward thrust, the tip is tightly coiled—the animal appears to be striking with its head. The bite of a coral snake is very dangerous, and living specimens should not be handled. These snakes can bite fingers, toes, and most fleshy areas of the body—rumors to the contrary are false. Also, certain individual coral snakes may be docile and reluctant to bite, but others may be temperamental and bite viciously at almost any moving object. These snakes are particularly adept at escaping from home-made cages, glass jars with screw tops, and other containers. **They should not be kept as pets.** The record length of the coral snake is 47-1/2 inches. Two subspecies occur in Louisiana, *Micrurus fulvius fulvius* (Linnaeus), the eastern coral snake, and *Micrurus fulvius tener* (Baird and Girard), the Texas coral snake. When one refers to the species only, the correct common name (which includes both subspecies) is the eastern coral snake.

Suggestions for Avoiding Venomous Snakes

"An ounce of prevention is worth a pound of cure." At no time is this adage more true than when dealing with poisonous snakes. It is better to avoid a bite than to treat one. The following list of suggestions, if practiced, should help one avoid snakebite.

1. When in situations where snakes may occur, be watchful where you place your hands and feet and observe carefully the spot where you intend to sit.
2. Do not walk through tall grass or heavy brush unless your feet and legs are well protected. Never step over logs, rocks, or other obstacles unless you can clearly see what is on the other side.
3. Wear heavy boots when walking in snake-infested areas, especially at night. Our Louisiana venomous snakes tend to be nocturnal, particularly during the hot summer months. Do not gather wood for campfires when it is too dark to see what you are doing.
4. Avoid rock piles, stacks of old boards, etc., particularly in wooded areas, around water, or in the vicinity of abandoned houses.
5. When walking among trees and bushes in and near swampy areas, watch for snakes sunning on limbs several feet above ground level. Boaters should use caution when moving their boats under branches overhanging the water.
6. Avoid wading or swimming in areas frequented by poisonous snakes. Contrary to popular opinion, snakes can and do bite under water.
7. When camping, sleep as high off the ground as possible. A cot may prevent a crawling snake from seeking shelter in the warmth of your sleeping bag on a cool night. If sleeping on the ground, sleep as far as possible from swampy areas, heavy undergrowth, and brush and rock piles.
8. Never handle a "dead" venomous snake. The animal may not be completely dead.
9. Leave live snakes unmolested. Do not attempt to kill or capture snakes.
10. To reduce the number of snakes around summer camps and residences, keep the area free of brush and trash. Remove piles of boards, roofing materials, etc., which might furnish cover for snakes. Fill in crawfish and other animal holes. Mow the grass frequently. Flower beds and shrubs with ground-level foliage may provide attractive hiding places for snakes.
11. Be particularly careful when moving boats left on shore for several hours or more. Boats resting half in and half out of the water serve as excellent cover for harmless water snakes and venomous cottonmouths.
12. Horsehair ropes and most other snake "repellents" do not work and should not be relied upon to keep snakes away from a given area.

Remember that snakes are rarely aggressive toward humans. If you encounter a snake, simply walk away and allow the animal to proceed on its way. Snakes are not fast-moving animals (although their moving elongated bodies may give the impression of speed), and a person can easily avoid a confrontation with an aggressive snake by a speedily executed retreat. Should a poisonous snake be encountered in the vicinity of a residence, it may be desirable to kill the snake. Never attempt to kill a poisonous snake with an instrument which brings one within the snake's striking range (usually estimated at less than one half the total length of the snake).

A word of caution may be necessary concerning the protection given by ordinary leather boots. Unless boots are of the commercial snakebite-proof variety, the leather is not thick enough to prevent the penetration of the fangs of our larger poisonous snakes. Boots will prevent the fangs of small snakes from reaching the flesh, and they may deflect the bite of a large snake or allow only superficial penetration. Ten-inch-high boots will protect against the bites of most snakes, but large snakes or snakes positioned above ground level may strike above such boots. It pays to watch where you place your feet regardless of the footwear worn.

Cottonmouth



Copperhead



Pigmy Rattlesnake



Canebrake Rattlesnake

Eastern Diamondback Rattlesnake



Eastern Coral Snake



Louisiana Milk Snake



Eastern Scarlet Snake

Recognition of Poisonous Snakebite

Despite precautions, one may be bitten by a snake or be present when someone else is bitten. The identity of the snake may not have been established at the time of the bite. The bite pattern and the presence, or absence of swelling, discoloration, and pain may supply clues as to the identity of the snake involved. Louisiana's poisonous snakes possess enlarged fangs, one row of teeth on each side of the roof of the mouth, and one row of teeth on each of the lower jaws (Fig. 2C-1). Harmless snakes have two parallel rows of teeth on each side of the roof of the mouth and one row on each of the lower jaws (Fig. 2C-3). If the bite pattern of four parallel rows of punctures is evident on the victim's skin, the bite was inflicted by a harmless snake. If one or two fang marks are present (Fig. 2C-2) or fang marks and only two parallel rows of teeth (Fig. 2C-1), the snake was venomous. In many instances, the bite pattern may be poorly outlined or the skin may be lacerated when the victim jerks away from the snake. In such cases, the pattern is of little or no value for identification purposes. Localized skin discoloration, swelling, and burning pain are symptomatic during the first 3 to 30 minutes after a bite from a cottonmouth, copperhead, or rattlesnake. The bite of a coral snake may produce similar local reactions, except that immediate swelling is rarely evident. Systemic effects accompanying serious cases of poisoning may include nausea, diarrhea, vomiting, dizziness, profuse perspiration, general weakness, difficulty in breathing, visual or auditory impairment, low body temperature, confused sense of balance, paralysis, convulsions, and muscular twitching.

Emergency Treatment of Snakebite

The bites of harmless snakes do not produce immediate swelling, discoloration, or intense burning pain in the vicinity of the bite. Fear and panic may, in some cases, induce severe emotional disturbances, and the victim may display one or more of the systemic reactions listed above. Such reactions are not caused by any substances injected by the snake.

1. Keep the patient as clam as possible.

Movements and emotional disturbances which increase the flow of blood and tissue fluids in the body will also increase the rate of venom distribution through the body. The patient should exert himself as little as possible and attempt to remain emotionally calm. A victim may be less disturbed if he realizes that the death rate from poisoning is very low and that most people recuperate quickly with little or no serious aftereffects. Do not apply potassium permanganate, chicken livers, or other home remedies to the wound. The victim should **not** consume alcoholic beverages.

2. Apply a constricting band.

Apply a lymphatic tourniquet about **2 to 4 inches from the bite and between the bite and the heart** (if possible). Unless a fang penetrates a deeper vessel, the venom disperses through the superficial veins and lymphatic vessels. **Almost any constricting band can be used in an emergency.** The tourniquet should be tight enough to restrict superficial circulation but not so tight as to restrict blood flow within the deeper vessels. Every 10 or 15 minutes the tourniquet should be loosened for 1 or 2 minutes. **The tourniquet should not be applied if more than 30 minutes have elapsed after the bite.** The value of a tourniquet is questionable if the bite was inflicted by a coral snake. While the use of a tourniquet is beneficial, tissue destruction at the site of the bite may be more severe than it would be if no constriction were utilized.

3. Use incisions and suction if warranted by conditions.

Many authorities feel that skin incisions and suction are of questionable value and that the time taken for such emergency surgery might be better spent in seeking the services of a physician. Other equally reputable men recommend such surgery as definitely beneficial for the bites of pit vipers **IF ADMINISTERED WITHIN SEVERAL MINUTES AFTER THE OCCURRENCE OF THE BITE.** The cutting and suction treatment is not a procedure for the squeamish. If medical help is reasonably

close and if treatment would delay the patient in reaching this help, he would probably be better off not attempting to incise and apply suction. If the use of this first-aid procedure would cause no delay in obtaining help and if the bite appears serious, such emergency treatment may be warranted. To utilize this treatment, make X-shaped or longitudinal incisions 1/8 to 3/8 inches long immediately over the fang marks and as deep as the fangs have penetrated. Multiple incisions in advance of the swelling are not advisable. Suction may be applied over the cuts by mouth or by the suction bulbs available in commercial snakebite kits. Mouth suction should be avoided if the administrator has open sores in the mouth or severe gum disease. This treatment is of little value if delayed more than 30 minutes after the bite. **It should not be used for the treatment of coral snake bites.**

4. Seek Medical Aid.

If the victim is alone, he should walk or drive to the nearest aid. If he is not alone and venom symptoms are obvious, the victim should be kept from walking, if possible. Enroute to the physician, the patient should be kept warm and the bitten limb should be immobilized as much as possible.

If ice is readily available, an ice pack may be applied to the skin around the wound. Certain authorities have suggested that the afflicted limb be immersed in ice water or covered entirely with ice. Recent research indicates that such treatment may be of little or no benefit and that harmful side effects may result from it.

If the victim is unduly nervous, reassuring words may be necessary to calm him. If shock develops enroute, the victim should lie prone with his head lower than his feet. In case of respiratory failure, artificial respiration is recommended.

Upon arrival at the hospital or the physician's office, insist on immediate attention and treatment. Inform the physician of the size and species of snake which inflicted the bite. If the patient has a history of allergies or unusual responses to bites or stings of venomous insects or other animals, this information should be communicated to the doctor. If the physician believes antivenin is necessary, intradermal and conjunctival allergic reaction tests should be

carried out before treatment begins. (If the patient shows a positive reaction to these serum sensitivity tests, he should be desensitized by the physician before serum is given.) Polyvalent crotalid antivenin (equine origin), administered intravenously, intramuscularly, or subcutaneously, is very effective for the bites of Louisiana pit vipers, but this antivenin should not be used for the bite of a coral snake. North American coral snake antivenin (equine origin) is a species-specific antivenin effective in the treatment of bites from our Louisiana coral snakes. **If poisoning is severe, immediate treatment with antivenin may mean the difference between life and death.** Both antivenins are made by Wyeth Laboratories, Inc., of Marietta, Pennsylvania. Most of our larger Louisiana hospitals stock ample quantities of crotalid antivenin. Coral snake antivenin has only recently become available, but several hospitals within the state have a limited supply.

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Edmund D. Keiser, Jr.
University of Southwestern Louisiana
July, 1970



entire ecological community begins to operate under a platform.

In the early 1950's visitors to the big coastal fishing rodeos were astounded to see the huge jewfish, Warsaw groupers, barracuda, amberjack, cobia, jackfish, red snappers and sheepshead the divers brought to the dock. There were gasps of astonishment from the crowds as the underwater spearfishermen proudly posed by their fish.

They were awed, too, at the sight of the divers walking around the weighing stations with their big knives strapped to their legs. The mere thought of men probing beneath the huge offshore structures armed only with spear guns and knives fascinated the spectators and will continue to fascinate them for years to come.

The International Grand Isle Tarpon Rodeo, which conducted its 43rd contest this summer and is the country's oldest competitive fishing classic, was the first major sport fishing rodeo to add a special division for skin divers. It now offers first, second and third places for jewfish, grouper, amberjack, cobia, jackfish, barracuda, red snapper and sheepshead. In addition a club award is presented by the Louisiana Council of Underwater Diving Clubs to the member club earning the most points based upon the King Spearfisherman point system.

During the years that have passed since the first underwater divers began exploring and spearing fish below the surface of the gulf, the number of diving clubs has increased throughout Louisiana. Today, there is a diving club in almost every major community in the state, and there are thousands of underwater divers in all parts of Louisiana.

One contributing factor to growing national interest in underwater diving and photography has been the accelerated interest in oceanography in recent years and in the scientific appreciation of diving as an additional useful tool.

It was a direct result of the interest in underwater diving and exploration that led to discovery of the only coral reefs in the Gulf of Mexico—the Flower Gardens, Valley Of The Rays, and the Church Steeples.

*...fishermen are shown arriving
...offshore petroleum plat-
...where they will dive for fish.
...successful diver is shown
...ing with a red snapper
...red beneath the offshore
...orm.*

*...w—Underwater diver is shown
...ending rope fastened to the
...on the surface and tied to
...petroleum platform. The guide
...is an important safety aid.*



There are three coral reefs in the Gulf of Mexico known as the Flower Gardens, Valley of the Rays and the Church Steeples.

Below—is a brilliantly colored sponge taken from one of the coral reefs that exist in the Gulf of Mexico.



the busy honeybee

McFadden Duffy

Photography by Lloyd Poissenot



Just where the expression "busy as a bee" originated is difficult to track down, but the chances are that it popped up around an apiary, which is a place where a collection of hives or colonies of bees are kept for their honey. That's where the action is. The hives are literally buzzing with activity.

Since an apiary may have a dozen or more hives, with each hive consisting of a colony of 40,000 to 80,000 honeybees, the average beekeeper may have several million workers. But he has no labor management problems. What goes on in the hive is an example of Nature's organization at its best.

Honeybees are often referred to as man's most beneficial insects, and rightfully so. Agriculture would suffer greatly without them. While it is true that bumblebees, wasps, hornets and others are good pollinators, we seldom have them in sufficient numbers to do the job. Instead, the task falls to the busy honeybees.

Some varieties of apples are totally dependent upon honeybees for pollination, since bumblebees are not out in force in early spring. Legumes such as alfalfa, red clover, and others must be insect-pollinated. In addition, we get a tasty pay off in the form of honey, with an additional bonus in the form of beeswax.

Some beekeepers say that maintaining apiaries is a sweet little sideline, or an interesting hobby which also produces regular profit; but national figures are both startling and impressive. There are over 300,000 beekeepers in this country. Annual production of honey is well in excess of 100,000 tons, accompanied by production of nearly 3,000 tons of beeswax.



Life inside a bee hive is perhaps the most orderly example of insect life that one can find and readily observe. The hive or colony can involve anywhere from 40,000 honeybees upwards to 80,000, but seldom more, regardless of the housing provided. All of the hive activity revolves around the queen bee. There is only one queen bee to a hive as a rule, but sometimes there have been two recorded. In those rare cases, they are mother and daughter, but never sisters.

The queen is in reality the mother of the hive, capable of laying between 1,500 to 2,000 eggs a day. She can live for four or five years, but efficient beekeepers replace their queen bees every year or two.

The majority of the residents of a hive are worker bees. These are females, but sexually immature. Their normal life span is five to six weeks during the honey flow.

Drones, which are males, have but one function in the hive. That is to mate with the queen. They do not have any stingers and do not work. In the fall, the workers drive them from the hive to conserve winter stores of food.

Nectar, gathered by the bee, is in the form of sucrose (table sugar). By the action of enzymes, it is broken down into dextrose and levulose. House bees, workers remaining in the hive, evaporate the water from the honey by forming thin films between

their jaws. Other bees fan their wings to make air currents.

One has only to visit an apiary and watch beekeepers at work to realize that honeybees carry on their operations with an intuition that is almost unbelievable. The work that goes on in the hive is extremely varied and demands intricate division of labor, yet the colony seems to have no form of government at all. The bees seem to know, without doubt or argument, which of them are to stay home and tend to the chores in the hive.

When a new honeycomb needs to be built they appear to decide unanimously just where it is to be placed. Even when a swarm is to be sent out to found a new colony, they agree perfectly peacefully on which bees are to be sent with the swarm and which will stay in the old hive.

These swarms of bees which one encounters now and then in life are in themselves one of the unusual provisions of Nature to assure continued life for honeybees.

Swarming of bees is a provision of Nature as necessary in the life cycle as the laying of eggs. Swarming is the way of starting a new colony. It is necessary to increase the number of colonies as it is to breed new individuals. If it were not for this instinctive self-preservation existing colonies might become very large and prosperous; but subject to occasional disasters which would eventually ruin them one at a time, until all could become extinct, in any given area.

Opposite Page—This may appear to be a great number of honeybees but the average hive can contain as many as 40,000 to 80,000 honeybees. Upper Left—Beekeeper is shown holding a tray of honeybees, showing the wax combs filled with pure honey. Right—Here a beekeeper is shown inspecting the interior of a hive. The average apiary may contain from a dozen to several dozen hives or colonies. Above—Beekeeper is shown brushing off beeswax from a comb. As a by-product of beekeeping in the United States, approximately 3,000 tons of beeswax is produced annually.



A thriving colony may swarm several times in a single summer. Each time thousands of the bees go out with a queen to look for a new home. As at some pre-arranged signal they leave the hive, making a great buzzing sound. Average persons are terrified at the sight of a swarm of bees, except professional beekeepers, who know that swarming bees rarely sting. They are so full of honey, as food for their journey, that they cannot easily bend their abdomens into the stinging position.

They usually settle first on the branch of a tree not far from the original hive, hanging on to it in a great mass of bees, often two feet in diameter. Then scouts are sent out to find a suitable place to serve as a new hive.

Beekeepers are usually prepared for this periodic swarming. If they shake the bees into prepared hives,

they will settle in these as their new abodes, even if they are close to the original hive. Otherwise they will follow one of the scouts to some place that has potential as hive housing. This sometimes presents problems and from time to time there are accounts of bees swarming into automobiles and other odd places from which they must be removed.

This always brings about concern on the part of the individuals involved because they do not know what beekeepers know—swarming bees are so filled with honey that they rarely sting and are actually easily moved to another location.

As is the case in many households, and a bee hive can be considered a huge household, all activity revolves around the lady of the house. In the case of honeybees, this individual is the queen bee. She is a highly specialized individual and her entire life is spent laying eggs. Because the entire future of the hive is dependent on this massive laying of upwards of 2,000 eggs a day, many people have the belief that the queen rules the hive. The queen does not decide what shall be done and she does not organize the work in any way. Scientists are hard pressed to explain just how the organization of the hive is brought about and generally resort to the term instinct.

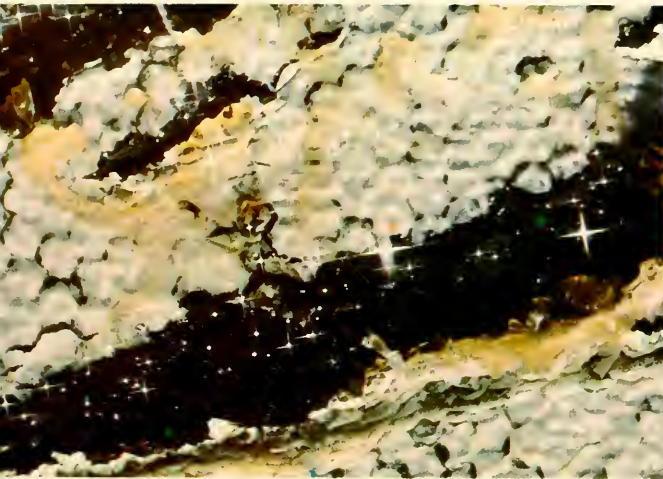
Wherever the queen goes in the hive she is surrounded by worker bees who always keep their heads toward her. It might appear that they are treating her with the homage due royalty, but a more logical explanation is that they are keeping their stinging-ends outward in order to prevent possible harm to the queen. Perhaps in the instinct that governs a honeybee hive, there is the certain knowledge that if anything happened to the queen, the colony would be doomed; for there would be no more eggs, and in a short time no more bees.

Those little six-sided cells made of wax that one finds in honey-in-the-comb are used by the bees not only for storing honey and other things, but also for rearing young bees.

Daily the queen goes about the hive



Upper Left—is a close up showing honeybees massed on a wax comb containing hundreds of cells which serve many purposes in the average hive, from storing honey to breeding more worker bees. Above—shows the interior of the comb. Honeybees use the six-sided cells to store royal jelly, honey, hatch more bees, and for other purposes. Opposite Page—Net product of thousands of hours of activity by countless thousands of honeybees is pure honey oozing from the comb.



methodically placing a tiny little egg in each waxen cell. Worker bees have already scoured the cell until it is spotlessly clean and covered it on the inside with a thin layer of "varnish" which is one of a number of secretions that bees make. The egg soon hatches into a larva, a small white grub, which is tended by the worker bees.

At first they feed it on "royal jelly", which is a highly nutritious substance, full of fine food values and containing assorted vitamins. The bees usually keep some of it stored in the hive. After two days of this rich, concentrated diet, the quickly growing grub is switched to a diet of "bee bread". This is a mixture of honey and pollen. This is also a rich food, for the pollen has proteins that supplement the large amount of carbohydrates in the honey.

Four days of feeding and the grub turns into a pupa. Worker bees cover the cell with wax at this point so that the pupa can be undisturbed for 12 days.

During this time it turns into a regular bee, with six legs, four wings, two large eyes, a complicated tongue, and an assortment of other apparatus such as pollen baskets on its hind feet or various parts of its body, the requisite glands for producing the various secretions, and those inbuilt instincts for living the amazing life of a bee and

undoubtedly enjoying it.

It bites off the wax covering to the cell, with the assistance of some of the other bees, and is at once a full fledged member of the hive, ready to go to work.

Practically all of the eggs laid by the queen develop into worker bees. Oddly enough, there are a few that hatch out into queens and about a hundred hatch out in a hive as drones. The drones are the only males in the hive. They do not work and come and go as they please. The workers feed them. If one would call it revenge, another might call it logic. In the fall when the mating season is over, the workers turn on the drones and chase them out of the hive to die in the open.

New queens are grown in larger cells than workers. They are fed exclusively on the best royal jelly and consequently grow larger than the workers.

Of special interest is the fact that the egg that is to be a queen is identical with one that is to be a worker. It is only a question of diet that makes the difference.

A drone grows up in a different type of cell, and the egg is different. It is an unfertilized egg, although workers and queens all come from fertilized eggs. Just how the queen knows how many drones to produce or how many queens are necessary to keep the colonies going is something that has

puzzled entomologists for years and will probably keep them perplexed.

In fact, the deeper one researches honeybees, the more fascinating the study becomes. There is so much to know about them, and strangely enough, so little that is actually known about the orderly instinct that governs life in the hive.

That the queen bee does experience jealousy has been established. The queen cells, and particularly the young queen bees when they hatch out of them, have to be protected from the "ruling queen". The workers simply block her path so that she cannot get at her offspring which she instinctively hates, if a honeybee can hate. If it were not for the workers constantly on guard, she would tear the queen cells to pieces.

When two queen bees meet, they engage in combat which ends only when one stings the other to death. There are times when the workers allow the queens to do this. Often they will keep them apart until one of the queens, probably the oldest one, is ready to depart with a swarm and thereby create another hive.

Once the swarm is settled, either in a nearby empty apiary box, or a hollow tree, the busy bees are busier than ever. They are immaculate house-keepers and immediately remove every particle of dust or dirt. They also make it tight by sealing up all cracks except the entrance, using "bee glue" or "propolis" which is a gummy substance they collect from certain trees whenever they have need for it.

The next step in establishing the new home is fascinating. There is immediate need for the construction of large amounts of comb for the storage of honey and incubation of eggs into grubs, then pupas, and finally into bees. This calls for beeswax. A number of bees form a row at the top of the hive, hanging on with their feet. Another row of bees will hang on to the first row. Then a third row will attach itself. This is repeated until a wall of suspended bees is formed.

They are seemingly inactive in this formation but actually an important process is going on. The bees are converting the honey in their stomachs

into wax which is extracted from between the scaly plates of their tiny bodies.

Before very long, instead of a wall of bees there is a wall of wax. Then more wax is formed to create the six-sided cells. These are added on both sides of the foundation wall. The cells are sloped upward a trifle so that gathered nectar from the flowers can be placed in them. The construction work goes on.

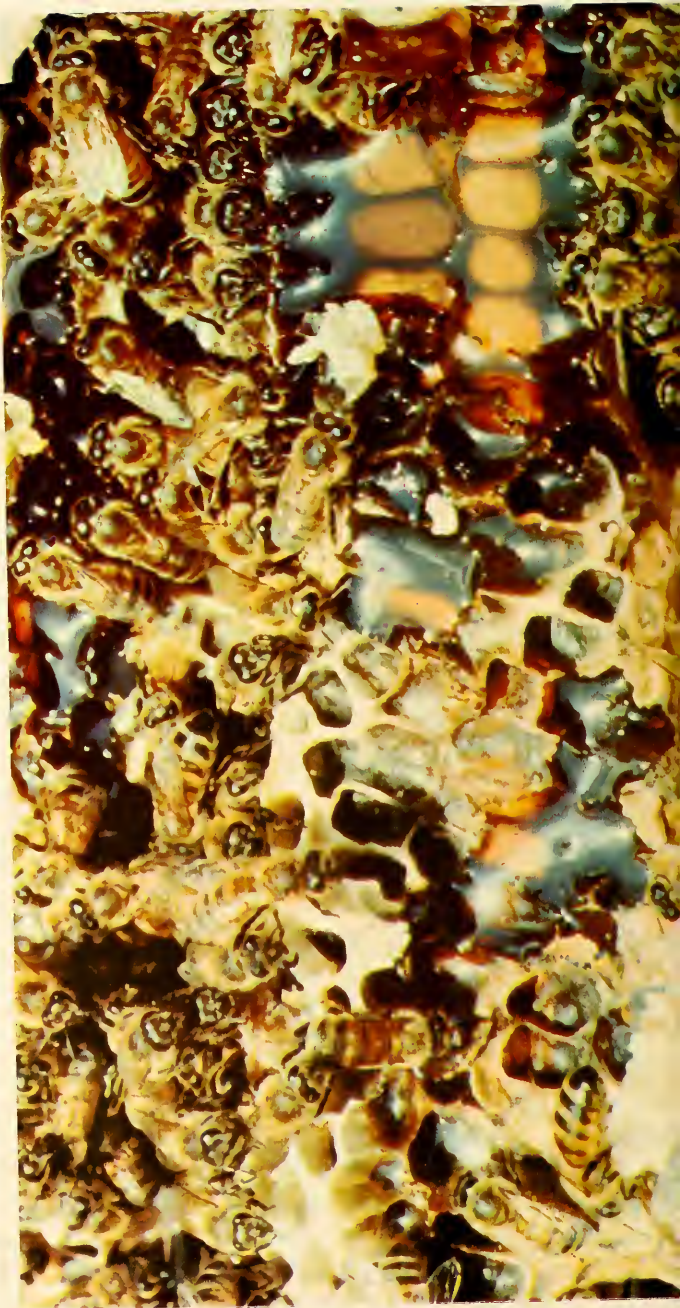
Back at the old hive a most important thing remains to be done. The new queen must be mated. She makes a few trial flights in order to orient herself and then starts on the one and great flight of her life—the mating flight. Bees can mate only in flight. While inside the hives, drone bees and the queen pay no interest in each other. This could be interpreted as a provision to prevent inbreeding. Yet, when the queen comes out of the hive and flies, she is immediately pursued by all the drones from her own and nearby hives.

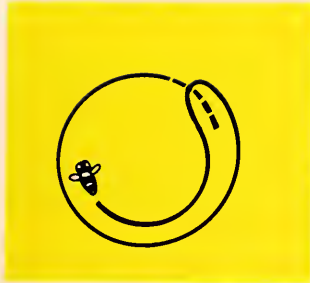
Mating is usually done high in the air and the drone dies immediately after mating. The new queen returns to the hive with approximately 4,000,000 sperm cells—far in excess of all the eggs she will ever lay.

After a hive is well started, with business buzzing smoothly, a regular routine takes place. Different types of work are designated to bees according to their age. The first phase of a bee's life is that of a "house bee" and then progresses to the role of a "guard bee", protecting the entrance from robber bees. The next chore is cleaning up the brood cells. On the fourth day, it serves as a "nurse bee" and feeds the older larvae with bee bread, taking it from that which has already been stored in the new hive.

By about the sixth day, the glands that secrete royal jelly have grown. Duties then change to feeding young larvae and queen larvae. After roughly a week of this the wax glands have developed and there is work on the comb to be done, plus duties with the bees engaged in sanitary work—cleaning out refuse and generally tidying up the hive.

There may be a few trial flights during the first 20 days of a bee's life, in order that it may learn the surroundings. When a bee becomes of age, at





Honeybees communicate with each other by means of an aerial dance. A circular type dance is used to indicate the distance to the pollen. This circular type dance will change to a figure-eight flight if the distance is greater. A zig-zag flight is the alarm signal and will alert all bees to possible disturbance of the hive.

21 days, duties involve fetching pollen, or nectar, or water, or perhaps more gum for propolis.

At the height of the flower season, honeybees become so busy bringing in nectar that they seem to wear themselves out and die in a few weeks. Meanwhile the queen is going about her business of laying from 1,500 to 2,000 eggs a day, which means that the daily hatch is about that number and all go through the hive training school before they leave to gather nectar.

If one wonders about this cycle of life and death, it is the honeybees born late in the season that live through the winter. They have honey for provisions and work extra hard to close every crack in the hive except for the tiny opening. For warmth they form a large ball and the heat of thousands of combined bodies keeps the temperature around 50°F, well above freezing.

Honeybees will venture out on mild days during the winter. Only the



queen and the lazy drones remain in the hive and their droppings are cleaned up by the sanitary squad. Some of the bees die in the winter, if it is a particularly severe one. But enough will survive to feed and keep their queen warm. She would be the last to die.

A cold winter is about the only time when honeybees are not busy, except with plans for the spring which include bringing in nectar as soon as it is available, sending out swarms to start new hives, and raising new broods quickly so that there will be many worker bees to fill the hive with honey.

Honeybees fly in a straight line,

hence the term beeline. A bee finds its way back to the hive by sight, seemingly remembering things along the way. When a worker bee is visiting clover, it goes only to clover. This is important because the flowers visited are properly fertilized with their own pollen.

That bees recognize flowers by color has been proved scientifically by offering them honey, or sugar water, on cards of various colors. They will search out a card by color on which they have already fed, ignoring the others even though they contain honey or sugar water.

When a honeybee finds a new source of nectar, he is able to inform the other bees where the new flowers are to be found. Experiments involving marking bees with tiny drops of paint and use of glass observation hives have proved this.

A honeybee with a new discovery gets the message across with a little dance. Sometimes it is circular, other times it is zig-zag—giving the direction. The number of waggings indicates the distance, and it is presumed that the aroma tells the other bees what type of flowers will be found.

Field bees turn over their nectar to house bees who store it in cells of the comb. It gradually ripens into honey, aided by enzymes. These are small quantities of chemical substances provided by the bees.

A pound of honey represents about 40,000 trips by worker bees carrying nectar. If the source is near the hive, the trips may be shorter but they are capable of working up to two miles from the hive.

Folks in various parts of the country brag about the distinct flavor of the honey they produce. It can be clover, alfalfa, peach, or you name it. Louisiana boasts of its orange honey, with nectar gathered from the orange blossoms in the citrus belt.

Wherever you travel through America you'll find folks boasting of their particular type of honey. It would take a connoisseur to tell the difference. This writer is not one of those experts.

Whatever flavor is produced from a special nectar is good and sweet. What thanks is due may be given to the little bees who have gone about their trade for untold centuries.

Opposite Page—is a typical view inside the hive. Various activities are going on and each bee seems to know instinctively what its job is. Some are feeding nectar or royal jelly to newly hatched bees. Others are storing honey or nectar. House bees are members of the clean up squads. Drones are taking life easy. There is perfect order, but no single bee is in command of the hive.

A Gentleman's Sport Re-discovered

Paul Kalman

NEW ORLEANS' CITY PARK for many years has provided the background for a highly popular one-day "big bass rodeo" intended to focus public attention on the opening of Summer fishing in the park's lagoons.

Among the requirements for participating in this early April tournament is that everyone must use artificial bait and some kind of rod and reel. The precise type of tackle is indicated on an entry ticket filed in advance with the judges.

During the first rodeo in 1946, the only two forms of eligible tackle were fly rods and plug casting rods, with approximately an equal number of entrants registering for each. This ratio continued virtually unchanged until 1951 when a strange type of import called "spinning" made its initial appearance at the park. A lot of people laughed at the awkward looking reels that resembled old fashioned coffee grinders, but lots of others took them seriously.

From a somewhat sluggish start, spinning soared in popularity to the point where, in 1967, some 70 percent of the 1,471 rodeo participants were using it. Of the remainder, 22 percent registered to fish with plug casting and so-called spin-casting rigs (considered as a single division) while a scant eight percent appeared at the park with fly rods.

In contrast, during the rodeo this past April, fly rodders displayed a surprising comeback by making up 17 percent of all the entries.

In the weeks following the rodeo, this author dreamed up the idea of conducting an informal survey among friends in the outdoor writing fraternity who live elsewhere in Louisiana to see if there was any significant resurgence of interest in fly fishing statewide. Several of these fishing editors said that sporting goods stores in their communities were selling almost as much fly tackle as spinning gear. This, at





Lloyd Poissenet

2.

siderably trickier since the angler must maintain a precise degree of control with his thumb to prevent the spool from running too fast and causing backlashes.

Relegated to a class exclusively by itself is fly rod fishing, the most sophisticated of all angling methods and—by far—the most difficult to master.

Spinning, spin-casting, and plug casting share a common technique in that the weight of the

All quality fly rods of recent manufacture are clearly labeled with the number of the fly line recommended by the maker. The fledgling fly fisherman will find it extremely beneficial to adhere to this recommendation and follow through by purchasing a reel that keeps the rod in perfect balance.

Within reasonable limits, almost any rod and reel combination will perform satisfactorily



Lloyd Poissenet

3.



Lloyd Poissenet

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least, was the case during the Spring when fresh water fishing interest is traditionally highest.

Pelican State anglers thus seem to be following a nationwide trend in weaning away from spinning and returning to an ancient sport whose beginnings date well before the Middle Ages. At the time Isaac Walton penned his classic "The Compleat Angler," fly fishing was already centuries old in Europe where willow or lemon-wood rods and woven horsehair lines performed functions remarkably similar to those made of the modern fiberglass and plastics.

In order of popularity, Louisiana fishermen use four basic types of tackle for artificial bait: spinning, spin-casting, plug casting, and fly. Spin-casting (where the line feeds out through the small hole in a closed faced reel usually mounted on top of the rod handle) is the easiest to use, with open faced spinning reels ranking second for simplicity of operation. Revolving spool plug casting reels are con-

lure is used to flex the rod whose spring-like response propels the lure on a low, arching trajectory toward its intended target.

In fly fishing, the lure's weight is completely inconsequential to the weight of the line which carries itself forward, trailing the fly behind on a long, monofilament leader. This weight factor explains why fly lines are several times bigger than spinning or casting lines.

In contrast to spinning, casting and trolling lines which are rated according to breaking strength, fly lines are labeled with a numbering system worked out by the American Fishing Tackle Manufacturers Association a few years ago to replace the cumbersome and often misleading practice of rating the line sizes with letters of the alphabet. Generally speaking, the higher the "AFTMA" number, the heavier will be the fly line, with sizes 11 and 12 being about maximum and sizes 5 to 7 the most popular.



Lloyd Poissenet

5.

Proper timing is the key to success in fly casting. In this sequence, photographed on the Little Bogue Bayou in St. Tammany Parish, Paul Dennis Kalman displays classic technique as he: 1. prepares to pick up line; 2. waits for line to arch overhead at apex of back cast; 3. completes back cast with line fully extended; 4. begins forward cast, and 5. completes cast with fly settling on water ahead of the line.



Paul Kalman

with spinning, spin-casting, and plug casting tackle. This is totally untrue with fly fishing.

As with their lines, fly reels come in a variety of sizes and weights. It is up to the fisherman—or an experienced salesman—to make the proper match. As a sidelight, it should be mentioned that this kind of expert guidance is seldom available in the big supermarkets and discount stores which sell so much fishing tackle on a cash-on-the-barrelhead, take-it-or-leave-it basis. One such outlet in New Orleans even displays a big sign advising fishermen of their hands-off policy on all tackle which breaks or fails to live up to expectations. This means that if you are buying fly tackle for the first time, by all means do so in the presence of an experienced fly fishing friend or reputable sales person whose store stands behind their merchandise.

Trial and error is the only accurate means of matching reel with rod. Fit several sizes of reels into the reel seat until you find one that keeps the rig perfectly horizontal when you support the rod

with two index fingers at a point where the fiberglass shaft enters the cork specie handle. The added weight of the line will then provide the precise degree of necessary balance.

Today's materials and manufacturing methods allow tackle makers to impart an almost limitless range of lengths, weights and actions to fly rods not available in the old days of split bamboo.

Choosing the ideal rod for your personal use involves a number of factors including the kind of fishing you will do, the size of your casting hand, and how much strength you possess in your hand, wrist and arm.

As a rule of thumb, eight feet is a good size rod for beginners to use on bass and bream. This may be short for the extremely big bass bugs (which I never use) but is certainly sufficient for the medium to small size lures. Also, there are many eight-foot rods which have more than enough "backbone" to handle even the biggest bass if the angler knows how to play them. The main point is that a rod of this size is light enough to be cast all day without causing excessive tiring.

In choosing a reel, you will have to decide between the simple single action and the automatics. Keep in mind that the fly reel is nothing more than a storage facility for the line. Except for balancing the rod, it plays absolutely no role in the casting procedure. For this reason, I have never used anything other than the old fashioned single action.

Salt water fly fishing—to be discussed subsequently—requires a single action reel fitted with an adjustable drag.

There are two basic types of fly lines: level and tapered. As its name implies, the level line maintains one size throughout its entire length of 35 to 40 yards.

The tapered line's diameter will vary three or more times, depending on the design and the use for which it is intended. Brook trout fishermen up North, for example, favor a "double-taper" line which



Lloyd Polissenot

Left—salt water fly rods are ideally suited for taking such husky scrappers as this eight pound redfish. Above—unique "Beer Belly" streamers tied by the author and his son are deadly on both fresh and salt water species. Body of lure is fashioned from an aluminum beer can.



Paul Kalman

is heavy in the middle and lighter toward each end. This allows the line to be reversed when one end shows signs of wear. The light end is intended to allow tiny trout flies to float down to the water in lifelike fashion rather than cause a splash that frightens the fish.

The most effective taper for bass bug fishing is the so-called "weight forward" or "torpedo head" line, with the "butt" or leading end roughly twice the weight of the "shooting line." This kind of line imparts added thrust to the forward cast, enabling the angler to handle the more wind-resistant bugs with considerably less exertion.

The main purpose of the monofilament leader in fly casting is to furnish a connection between the lure and line which will be invisible to the fish. It is therefore advisable to use longer leaders when the water is clearer and shorter

er than the overall length of the rod (they become too hard to handle).

The "butt" end of the leader should be the same size, or only slightly smaller, than the point where it is tied into the line.

With a few lures, your final purchase will be a small can of cleaner-dressing for the line. Most of these contain silicones which help the line slip freely through the guides. All lines should be cleaned periodically and they will perform much better.

Except for some spring-fed streams which can be waded (see illustrations), most fresh water fly fishing in Louisiana is accomplished from boats of various types and sizes. The new electric motors are tailor made for fly fishing but if you don't have one, you can do almost as well by finding the laziest bum in your neighborhood and talking him into paddling you. Plenty of candidates are available for this assignment if you'll simply agree to give them half your catch.

One of the prettiest and most relaxing sights in the entire realm of sport fishing is that of a flat bottom boat drifting almost imperceptibly down a moss draped bayou with the master fly fisherman casting his bug every foot or two along the shore and his paddler half asleep in the stern.

The pure delight of such gentlemanly pursuits was what attracted such well known early Louisiana fly rod lions as Charles Rhodes, Judge George Janvier, Lester Nelson, Eddie Fayard, Hermann Deutsch, John M. Parker, Jr., and Harry Head. In their prime, any member of this select group could work near miracles with the fly rod, coming home regularly with back-breaking strings of bass and bream on dog days when their plug rod contemporaries could only stand by and gape.

The late Hermann Deutsch became so thoroughly addicted to fly fishing that he would pull up fly stakes and quit rather than switch to the plug rod when the fish were sulking down deep. Deutsch

claimed as much in an article he did on bass bugging for the Saturday Evening Post in which he stated: "I would rather die than be caught with a plug rod in my hands."

An equally vocal fly fishing aficionado, John M. Parker Jr., recalled during a recent interview how he fathered one of the first, and certainly the most famed, fly rod lures ever created by a Louisianian.

Now 79 and retired in Pass Christian, Mississippi, Mr. Parker fondly recounted the story of how he selected roosters and fighting cocks, had them caponized and raised them for a year or more simply to obtain perfectly formed neck hackles to be used in tying his unbelievably effective "Parker Feather Minnows."

"I applied different colors of feathers for different types of waters," said Mr. Parker. "For instance, my best bug for Pearl River and similar streams was tied with tails that had a whitish-silver streak bordered in jet black. The murkier bayous such as Bayou Liberty and Bayou Lacombe required dun colored or reddish brown tail feathers from Rhode Island Red roosters. I experimented with all sorts of combinations before hitting on the right ones. You could always tell if you were using the wrong color when the bass would knock the bug out of the water without getting hooked. If the color was right, they'd devour it."

When word about his successful formulas began getting around, Mr. Parker was besieged by friends seeking to obtain samples of his lures.

"I never attempted to commercialize on my feather minnow so it was impossible for me to keep up with the demand," he collects. "To make even a single bug took from 45 minutes to an hour, and this cut rather deeply into the time I might otherwise been fishing. Finally, one of my friends got in touch with E. H. Peckinpaugh up in Chattanooga, a professional bass bug manu-



Left—some bass bugs are made to resemble insects and minnows, but this old fashioned "Skitter Bug" looked like nothing found in nature. Above—in its day, the Fayard "Cripple" feather minnow was the most popular fly rod lure in South Louisiana.

ones when the water is dark or turbid. In any case, your leader should never be shorter than half the length of your rod (three quarters is more preferable), nor long-

facturer, and asked him to duplicate my minnow. Peck called me on the phone one day and offered to buy my design. I told him it wasn't for sale but that I would give it to him simply so my friends could have an opportunity to fish with it. I've never earned a dime from my lures but if I had a dollar for every bass they've caught, there'd be a pile of money to show for it."

Two Louisiana sportsmen who did commercialize with bass bugs in a modest way during the old days were Eddie Fayard and Lester Nelson, both of whom have since departed for the Great Valhalla where all the bass weigh more than 10 pounds. Nelson worked nights as a musician and spent his days at the fly tying vise. For about 10 years, his Nelson Poppers were available in limited quantity in New Orleans stores where anglers snapped them up

needed to protect them from countless crashing strikes.

For as delicate an art as fly fishing appears to be, the results it produces are often far from mild.

At this writing, the major outdoors magazines are filled with articles and advertisements citing the accomplishment of Captain Stu Apte, a Pan American Airways 747 jet pilot, who recently captured a 154-pound tarpon down in the Florida Keys to set a new world's tarpon record for the fly rod. The leader used by Captain Apte had a breaking strength of only 12 pounds, but this was enough to subdue the giant silver king in less than 40 minutes.

Which brings up some popular misconceptions about fly fishing

In contrast to what most people think, the fly rod will usually kill a fish much faster than spinning tackle of approximately the same

even match.

On the other hand, fly fishing will—as a general rule—produce considerably more fresh water fish when they are biting on the surface for the simple reason that an accomplished fly caster can cover more water than spin or plug casters. The only plug caster I know who may dispute this is Emile Iacononelli of New Orleans who has fished bass four or five times a week for the past 40 years and uses the plug rod with blinding speed. Emile, whose credo is: "You can't catch fish unless the lure is in the water," covers any given stretch of shoreline as thoroughly as the most expert fly fisherman.

As it relates to fishing in Louisiana, the word "fly" is a misnomer because very few anglers hereabouts use the tiny No. 12 to No. 20 duplications of insects and insect larvae which are needed to catch true, cold water trout.

The most effective lures in Louisiana include those resembling minnows, spiders, grasshoppers, dragon flies, shrimp, and even baby frogs. In addition to these, there are some highly effective fly rod lures that look like nothing found in nature. One such lure produced by Peckinpaugh years ago was the popular "Skitter Bug." It came in every color of the rainbow, made gurgling noises when retrieved, and should have frightened bass instead of inciting their appetites.

Bream and crappies are considerably less demanding in their feeding habits and will attack a wide variety of surface and sub-surface fly rod lures.

Last Winter, my son, Paul Dennis, and I came across an article in SPORTS AFIELD describing a wild creation dubbed the "Beer Belly" for the most appropriate reason that it was fashioned from a section of aluminum beer can covered with woven plastic "Mylar" tubing dressed with squirrel tail and deer hair. The finished product looked remarkably like a silver minnow. In the interest of helping clean up the environ-



Paul Kaiman

as fast as Lester made them.

Eddie Fayard, a carpenter and cabinet maker of superb artistry, developed a "Fayard's Cripple" which, for quality and fish-catching ability, defied description. As with Nelson, Fayard was forced to moonlight to keep up with the demand for his beautiful little lures. Eddie's wife, Lou, worked by his side most of the time, applying seven separate layers of lacquer and undercoat that made the Cripples shine like diamonds and gave them the durability

size. If Apte had been using spinning gear with 12-pound test line, his 154-pound tarpon might have required several hours to bring to gaff.

In a similar sense, it is silly to believe that the bigger lures used on plug casting and spinning tackle will insure catching bigger fish, most particularly bass. In the City Park Bass Rodeo, now 27 years old, at least half the biggest fish were caught on fly rods during those years when enough fly tackle was used to make it an



Opposite page—"Bucktail Popper" is typical of fly rod lures which are widely used elsewhere in the U.S., but find little favor among Louisiana anglers. Above—feather hackle and tail of this "Kalman's Killer" popper is irresistible to bass and crappie. A smaller version works extremely well with bream.

ment, we decided to duplicate it. I quaffed a cold Pilsener while Paul Dennis got busy with his vise and fly tying materials. Within the hour, we turned out a half-dozen "Beer Bellies," drove to nearby City Park, and captured a stringer of slab-sided crappies that caused one golfer teeing off nearby to muff his shot and hit the ball straight up in the air.

Paul Dennis has gone fishing with me almost from the time he could walk but it was not until he was nine that I decided to break him in on the fly rod. From what I had been told, kids any younger are too awkward and lacking in attention to devote themselves to proper fly casting technique. Given to him as a Christmas present, my son's first rod was a 6.6 inch Shakespeare fly stick which he refers to fondly as his "fairy wand." It tilts the scales at a scant two ounces and is, by this time, a candidate for retirement.

After teaching him the basics, I turned Paul Dennis loose in the back yard where he spent endless hours tossing a small hookless bug at an imaginary bass. He repeated this procedure every day for at least one hour after school, walking over to City Park on weekends to try his hand at the real thing. He has read at least twice every book in my library containing a few paragraphs on fly fishing until he knows the nomenclatures and phrases upside down and backwards.

Today, he throws fancy "roll casts" (to get under overhanging branches), can cast sidearm, and is able to use the fly rod equally well in either hand.

Four years after starting, he is just about ready to receive his diploma.

A week or so after this year's City Park Bass Rodeo, we accompanied commercial seaplane service operator Steve Littleton on a quickie trip out to Breton Island where a larger version of our fabulous "Beer Belly" produced wondrous results with the redfish and speckled trout.

This leads us to fly rods and

salt water. Throughout the Florida Keys, the Bahamas, and all along the Atlantic Seaboard, salt water fly fishing has been popular for more than 20 years but only recently has Louisiana opened its eyes to this effective and extremely sporting method of angling.

My own introduction to salt water fly fishing occurred in 1951 when I took my first tarpon on a fly from the Gatun River in Panama. Since then, I have boated sailfish on streamers off the Pacific Coast of Panama, many tarpon in Yucatan and Campeche down in Mexico, and more bonefish than I would care to count in the Bahamas where a tiny lure made to resemble a pink shrimp is infinitely more effective than the genuine article. In one morning at Treasure Cay, Great Abaco in the Bahamas, my daughter Kathy helped pole the skiff as I caught 16 bonefish on the fly.

Here in Louisiana, we have several salt water species which are ideal fly rod fare including cobia and dolphin in addition to the aforementioned trout and redfish. Tarpon will take a big streamer fly very quickly but are difficult to fight if the water is much deeper than 10 feet.

In summary, fly rod fishing appears well on its way toward re-gaining the popularity among Louisiana sportsmen it once enjoyed but somehow lost because of spinning and similar reasons.

A difficult and complex sport, it is not for just anybody.

To be successful and happy, the beginning fly fisherman must possess—before everything else—a high degree of patience mixed very carefully with fortitude, finesse, and an acute sense of timing. Lacking any of these attributes, he is infinitely better off sticking with the more prosaic spinning or plug casting.

On the other hand, if you have the basic qualifications and a willingness to learn, you are destined to find in the fly rod a form of urbane angling which, in the world of outdoor sport, has no peer.



wildlife stamp dedication ceremony

June 12, 1971, marked what was considered by many as quite an honor which was paid to the State of Louisiana by the United States Post Office Department. The occasion was the first day of issue ceremony, introducing the U. S. Post Office Department's four newest eight-cent, Commemorative stamps depicting the alligator, California condor, polar bear and trout.

The setting for the ceremony was a lush green, tree-canopied portion of Avery Island's noted Jungle Gardens, set in a stately background of picturesque white egrets, nesting in the famed Bird City.

Among those in attendance as Clark M. Hoffpauer, director of the Louisiana Wild Life and Fisheries Commission, delivered the welcoming address were: James W. Hargrove, Assistant Postmaster General, Elvis J. Stahr, president of the National Audubon Society and Edmund McIlhenny, a direct descendant of one of the island's founding families, who presided at the ceremony.

Hargrove pointed out that the Post Office Department was issuing 150 million of the stamps in the new series which will be in post office panes of 32's. He added that the stamps were designed by Stanely W.

Galli of California, whose 1968 wood ducks were nationally acclaimed.

Hargrove also noted that these would be the last stamps issued by the United States Post Office Department, which would cease to exist on June 30, in order that its predecessor the United States Postal Service might take over, beginning July 1.

It was pointed out that Avery Island was extended the honor of being selected by the Post Office Department as the site for the ceremony because it is a representative focal point where industry and nature dwell side by side. It was on Avery Island that the first salt mine was discovered in North America and oil, too, was found on the island just after World War II. The part that sets Avery Island aside from most places is the way that industry blends so harmoniously with an oak forest and marsh plains where deer, geese, ducks, raccoons, squirrels, alligators and hundreds of other species of wildlife wander freely in a carefully preserved natural environment.

The credit for this most unusual mixture of industry and wildlife must be given to the six generations of the Avery-McIlhenny family who settled the site over 150 years ago and still manage it to this day.



Pictured above, left to right are: Rev. Raymond Robitaille, Walter McIlhenny, M. A. Wright, Clark Hoffpauer as he delivers the welcoming address, Edmund McIlhenny, and Dr. Elvis Stahr.

Lionel Treanor

*Inside Back Cover By Bob Dennie
Back Cover By Lloyd Polissenot*



